

APRIL, 1956

Commercial Fertilizer

and PLANT FOOD INDUSTRY

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condition of mixed fertilizers...**

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Ammonia**

American Nitrate of Soda

A-N-L® Nitrogen Fertilizer

Urea Products

Sulphate of Ammonia

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The simple answer to many fertilizer conditioning problems is to persuade the ammonium chloride salts formed in the ammoniation process to crystallize as cubes instead of in the shape of needles or ferns.

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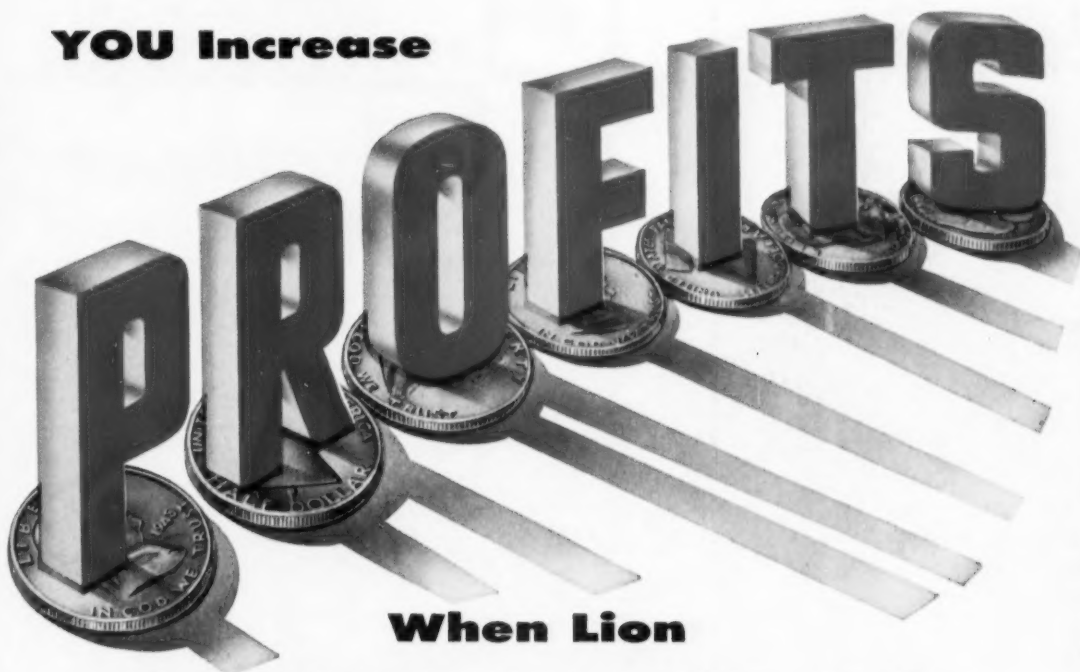
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75 Third St., N. W., Atlanta 8, Georgia.

Commenting **F**reely

by **BRUCE MORAN**

I'd like to broaden the statement recently made by Joe Lanter, president of Central Farmers Fertilizer. He said that the technical and corporate revolutions going on in the fertilizer industry may give the co-ops a "tough time staying in the buggy."

That applies just as forcefully to anybody in the industry, be he a dry-mixer or a multi-million dollar petrochemical operator. As Mr. Lanter said further—"Survival literally depends on the soundness of long-range planning. Chemical research

and process development may well determine whether present plants are still operating five years hence . . . whether they're an asset to agriculture or a millstone retarding the farmer."

Those are rough words, but true. Part of our industry is doing a brilliant technical job, with a deep-digging program of sales and farmer-education. Part is still in the Georgia-buggy era—placid and still undisturbed by the rumblings all around.

What's your status?

Vol. 92 No. 4

Established 1910

April, 1956

Commercial **F**ertilizer

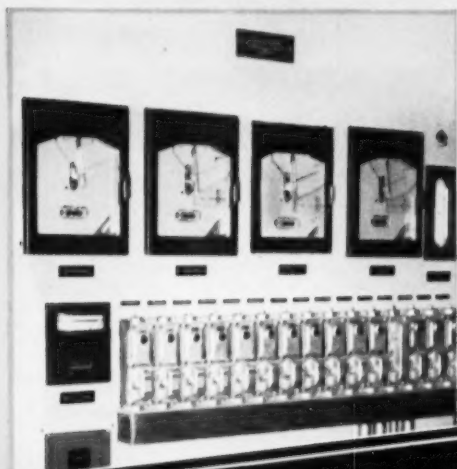
and **PLANT FOOD INDUSTRY**

Subscription rates: United States, \$3.00 per year; 5 years, \$12.00. Foreign \$5.00 per year.

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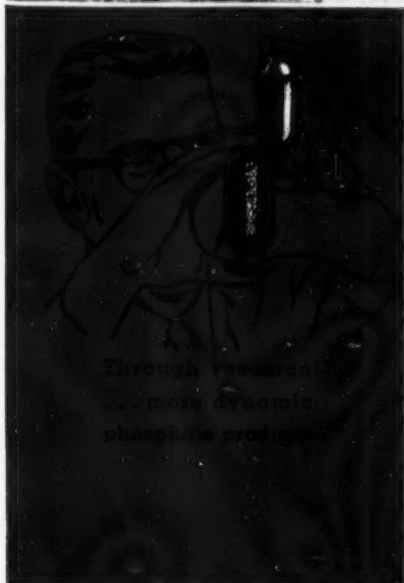
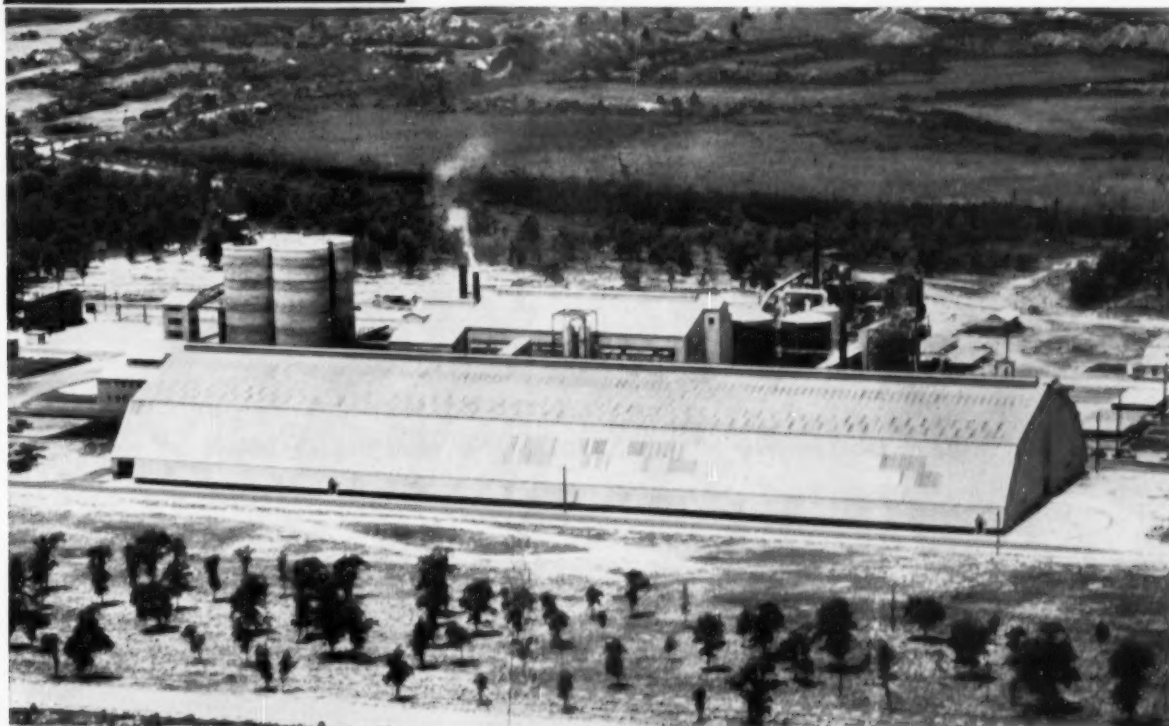
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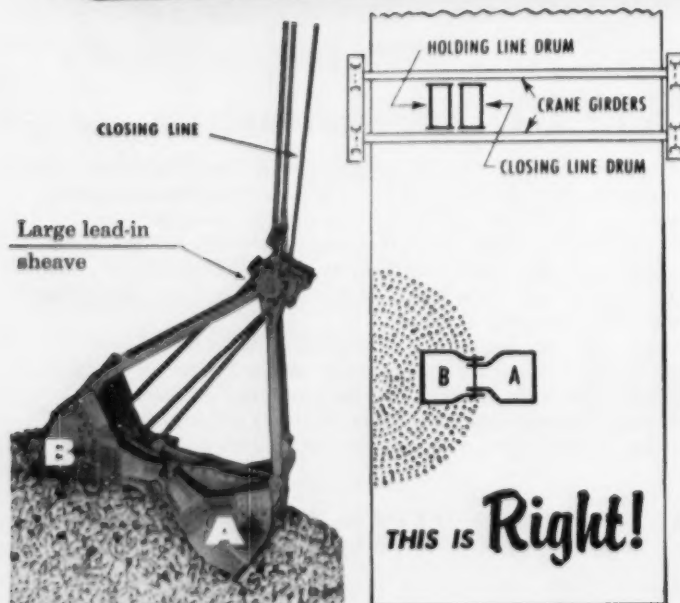
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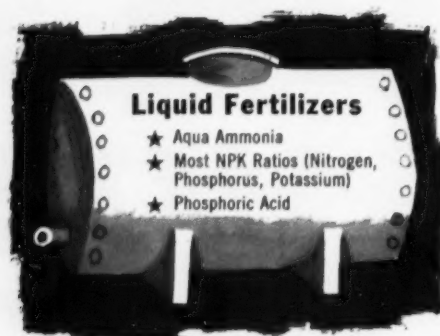
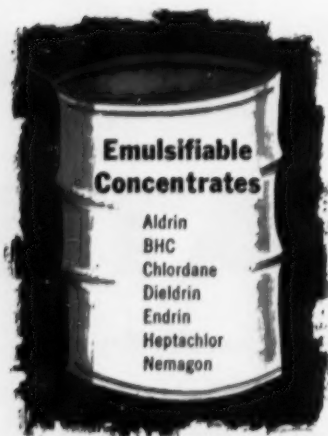
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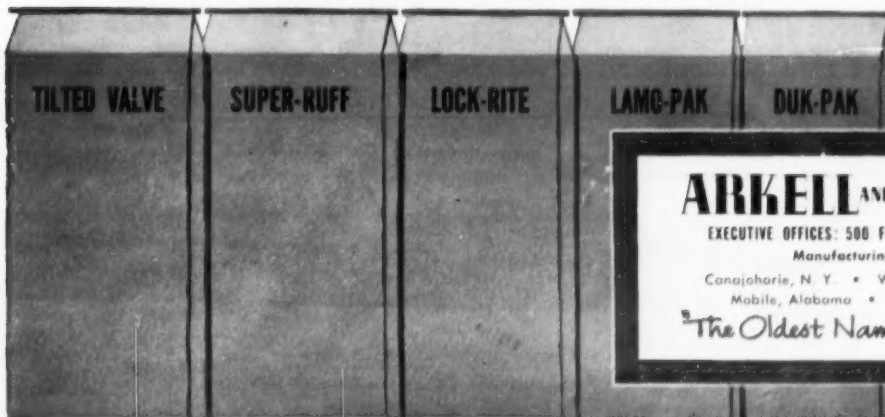
your product pours out through the smooth, wide multiwall mouth...no waste and no time lost.

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*Water Proof Paper Lined

— at a lower cost than rigid containers

By: T. R. Moorer, Sales Manager, Bag Division, Fulton Bag & Cotton Mills, Atlanta, Georgia



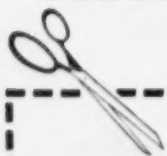
Protecting costly chemicals from moisture, whether in transit or in storage, is only part of the problem. An equally important factor is to do so at the lowest possible cost.



Old-fashioned methods required expensive, heavy, rigid containers to keep moisture in its place. This also added to transportation cost and required extra warehouse space. Fulton WPPL bags have provided the answer.



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Please write ☐

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help solve your
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problem

†Fulton's polyethylene-lined waterproof bags are acid and alkaline resistant.



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Sohio's technical service staff will be happy to help you select the exact solution that best fits your own needs . . . the one that produces best results at lowest cost.

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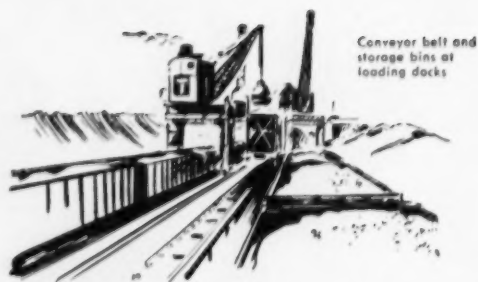
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Sohio's new truck fleet assures super-fast delivery within trucking area . . . and the 5 rail lines that serve Lima — Nickle Plate; Baltimore and Ohio; Erie; Pennsylvania; and Detroit, Toledo and Ironton, provide excellent service to all points. Sohio's loading facilities and large storage capacity assure rapid servicing of every order.



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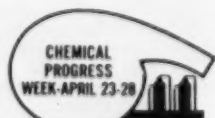
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FERTILIZER
PLANT**

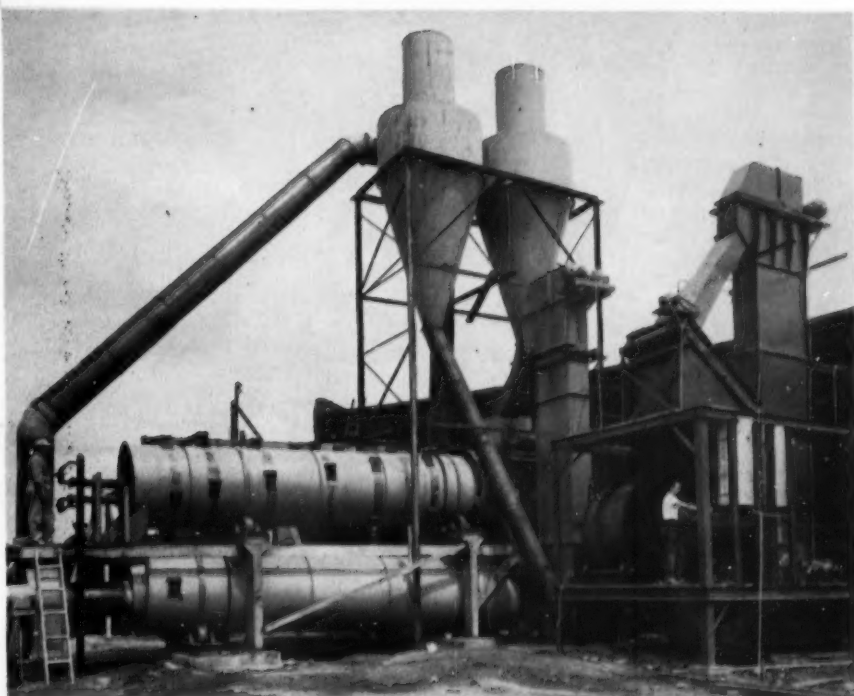
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Profits*

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REDUCES INVENTORY

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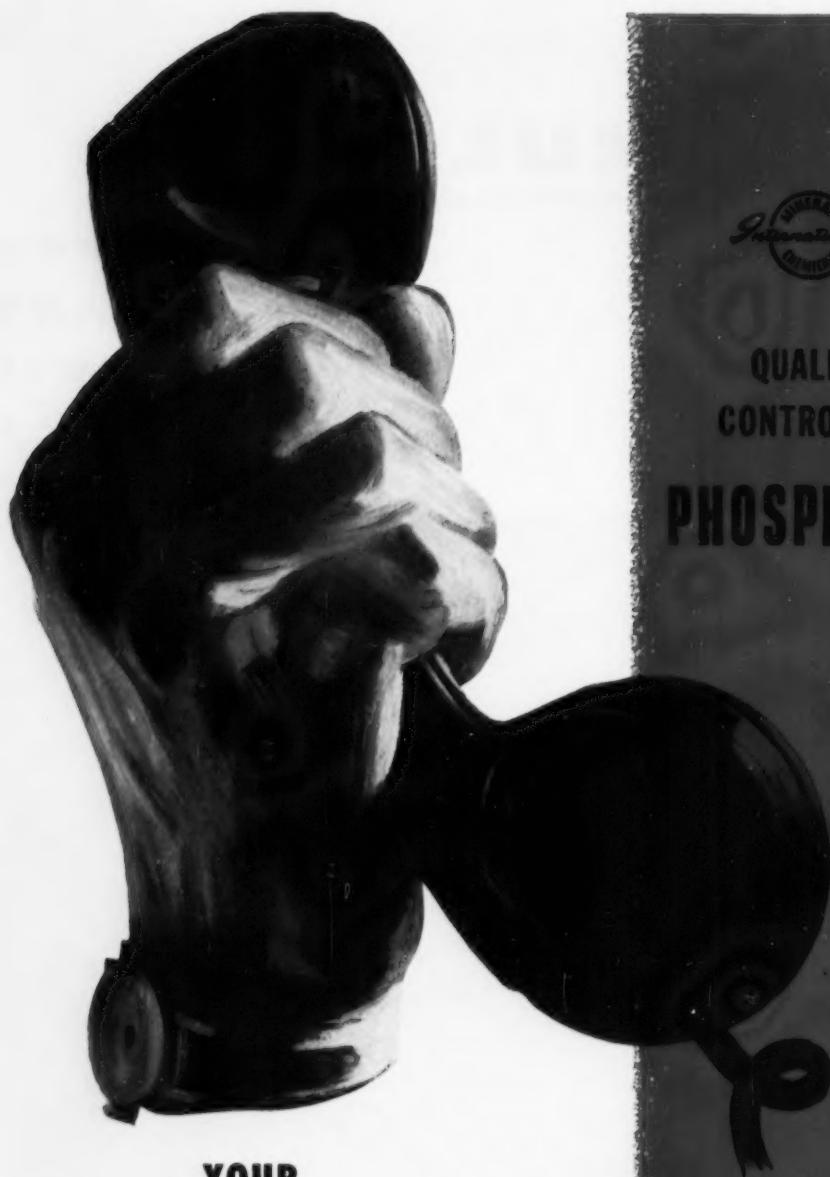
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- for the manufacture of industrial chemicals.
- ground rock phosphate for direct application to the soil.

Placement, Time and Rate of Phosphorus Fertilizer Application For Fall Seeded Small Grain In Relation to Yield, Phosphorus Uptake, and Efficiency of Phosphorus Use

Nature And Scope Of Problem:

Throughout the United States, phosphorus fertilizer needs of small grains usually are supplied at time of seeding. Where forage crops also are seeded with the small grain, as is common practice in the northern sections, initial fertilization practices are influenced by the need for supplying nutrients to both crops. In these areas, supplemental top-dressing of phosphorus and potassium on leguminous meadow, and of nitrogen, in particular, on grass, often is recommended.

In the South, oats or wheat are fall-seeded without a companion crop. While all phosphorus is supplied at time of seeding, frequently only a portion of the nitrogen is supplied with the remainder being top-dressed the following spring. The result is less leaching of nitrogen by winter rains and more efficient use

By Dr. George Stanford
TVA, Wilson Dam

of the applied nitrogen fertilizer.

The possibility of delayed application of phosphorus fertilizer for small grains has received little attention. The problem may merit investigation since such a practice, if feasible, would provide alternative means of fertilization. The added flexibility would be advantageous to fertilizer producers as well as farmers.

Objectives:

1. To determine the relative efficiency of delayed (top-dressed) and initial (drilled or broadcast and disked) phosphorus fertilizer applications.
2. To determine the relative efficiency of split application (divided between fall and spring) and single initial or delayed application of phosphorus fertilizer.

Plan Of Experiment:

1. Treatments. *(CSP as phosphorus source)
 - a. No phosphorus (basic N and K)
 - b. 40 Lbs. P_2O_5 Bdcast before seeding.
 - c. 80 Lbs. P_2O_5 Bdcast before seeding.
 - d. 40 Lbs. P_2O_5 Bdcast 2 wks. after seeding.
 - e. 80 Lbs. P_2O_5 Bdcast 2 wks. after seeding.
 - f. 20 Lbs. P_2O_5 Bdcast before seeding.
 - 20 Lbs. P_2O_5 Bdcast following spring.
 - g. 40 Lbs. P_2O_5 Bdcast before seeding.
 - 40 Lbs. P_2O_5 Bdcast following spring.
 - h. 40 Lbs. P_2O_5 Bdcast spring after seeding.
 - i. 80 Lbs. P_2O_5 Bdcast spring after seeding.
 - **j. 120 Lbs. P_2O_5 Bdcast before seeding.
2. Replications 3-4
3. N and K Applications 20 to 40 Lbs. at seeding.
20 to 40 Lbs. Following spring.
4. Analysis of Experiment
 - a. Rate of CSP curve.
 - b. Analysis of variance.Treatments "b" through "i" constitute a factorial comprising 4 "practices" and 2 rates of CSP. With 4 replications, 32 plots will be needed. 8 additional plots, or 40 total will complete the experiment.

* Where drill is used, substitute "drill" for "bdcast before seeding". Other "bdcast" treatments refer to top-dressing on surface without further incorporation.

**120 Lbs. P_2O_5 included to provide rate curve as a basis for evaluating other times or frequencies of application. Suppose, for example, that treatment "g" is superior to "c". Such a result could be evaluated in terms of the curve expressed as equivalent of CSP applied in the conventional manner, i.e., broadcast before seeding.

TVA Supervisors Hold Conference

State extension-TVA supervisors for over 2,500 test-demonstration farms in the seven Valley states of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia met at Knoxville March 13-14. The purpose of the meeting was to discuss joint plans for 1956 and 1957.

One topic discussed was the kinds, amounts, and characteristics of experimental TVA fertilizers that will be produced by the chemical engineers at Wilson Dam during the coming months. Farmers use these new and concentrated fertilizers in an education and demonstration program under the direction of the county agent. The reports which they make on their experience with such fertilizers are useful to TVA in the operation of its experimental fertilizer plants and to the extension service in making recommendations for the more efficient use of fertilizers.

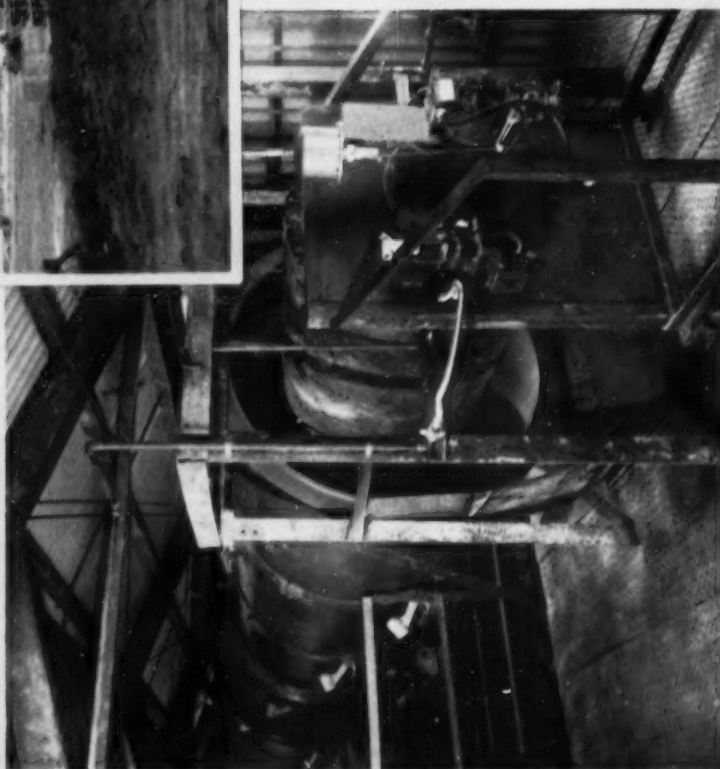
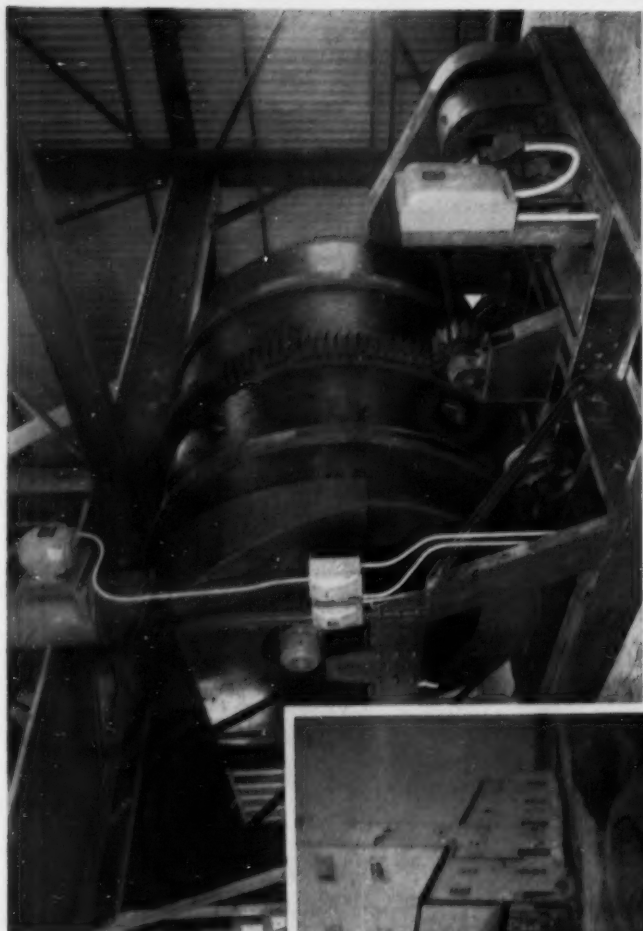
Other topics on the two-day agenda included college and TVA assistance to the Tennessee Valley Association of Test-Demonstration Farm Families in sponsoring a Valley-wide 4-H Club encampment to be held at Fontana Village Inn in June and the possibility of sponsoring a farm planning seminar later in the year. The last such meeting between Valley test-demonstration farm supervisors and TVA was in September.

Fertilizer Regulatory Act Advanced In Pennsylvania

Pennsylvania's House of representatives unanimously passed, March 14, and sent to the State Senate for concurrence a bill which would require registration with the state of every grade and brand of commercial fertilizer and fertilizer material sold in the state. The measure calls for a "control inspection fee" of five cents a ton and a licensing fee of \$15 a year for each brand and grade, with the funds to be used for enforcement of the act.

Liquid fertilizer and other similar new products would be covered by the bill.

Every person distributing commercial fertilizer would have to file semi-annual statements showing how much he distributed by counties during the previous six months.



NORTHWEST CO-OP GRANULATION PLANT COMPLETED IN 4 MONTHS

Northwest Co-Operative Mills has announced the start-up of the granulation unit addition to their plant at Green Bay, Wisconsin.

G. O. McMillin, manager of the fertilizer division, advises that test runs of equipment and initial production of granular fertilizer started in late January. A Stedman-Snyder granulation unit has been installed in a 9,000 square foot steel and transit addition to their existing plant on North Bysby Avenue. All of the equipment was designed and furnished by the Stedman Foundry and Machine Company of Aurora, Indiana. The modern building addition was designed by the Muskogee Iron Works of Muskogee, Oklahoma.

Start-up procedure and initial production were under the supervision of H. R. Krueger, Stedman sales engineer. The granulation unit is designed to produce 20 tons per hour of granular fertilizers or larger tonnages of conventional fertilizers through the same system. Dry materials are proportioned by the newest Omega Gravimetric Totalizing Feeders and liquids are handled by Fischer-Porter Recording-Totalizing Flowrators.

Mr. McMillin believes a near all-time record was achieved in fertilizer plant design and construction, as the switch was thrown to place the plant in operation just four and one-half months after ground was broken. In the face of adverse weather and rapidly approaching winter, construction was pushed steadily

forward.

"This remarkable record was achieved by the splendid co-operation of our many suppliers, contractors and friends," he said. "Without this co-operation, the starting date never could have been accomplished."

Northwest Cooperative Mills is the supplier for three regional cooperative wholesalers: Farmers Union Central Exchange, South St. Paul; Midland Cooperatives, Inc., Minneapolis and Central Cooperative Wholesale, Superior, Wisconsin.

A. H. (Tony) Roffers is general manager of Northwest Mills at St. Paul. Tom O'Brien is plant manager at Green Bay, with Dominick Stoler in charge of the Winona plant. William E. (Bill) Jones is in charge of research and development in the fertilizer division.

PAC.N.W. P.F.A. Sponsors Demonstration

A farm demonstration project is being sponsored by the Pacific Northwest Plant Food Association in Washington County, Near Hillsboro, Oregon.

The objective of which is to develop a demonstration showing maximum forage production and efficient use of this forage in a dairy farm operation to produce maximum profits. Maximum forage production and best use will be realized through: 1. Proper fertilization and lime; 2. Pasture management, rotation grazing, etc. 3. Planting the best producing plants. 4. Proper irrigation. 5. Efficient use by livestock. 6. Herd management and selection of good cows.

Members of the Technical Committee are: ASC — George Potter; Soil Conservation Service, John Anderson; OSC Soil Specialist, T. L. Jackson; OSC Dairy Specialist Don Anderson; OSC Management Specialist Manning Becker; OSC Crops Specialist Rex Warren; Farmers Home Administration Victor Mad-

sen; PGE Co. Floyd Miller; Pacific NW Plant Food Association, Grant Braun; OSC Irrigation Specialist Marvin Shearer.

Truog, Wood Featured At CFA April 16-17 Meet

Professor Emil Truog, Chairman, Department of Soils, University of Wisconsin, Madison, Wisconsin, and Dr. G. B. Wood, Head of the Agricultural Economics Department of Oregon State College, Corvallis, Oregon, will be among the featured speakers at the Fourth Annual California Fertilizer Conference, it was announced by J. H. Nelson, Stockton, chairman of the committee in charge of conference arrangements. Sponsored by the Soil Improvement Committee of the California Fertilizer Association, the affair will be held on the campus of the Citrus Experiment Station, University of California, Riverside, California, on April 16 and 17. More than 300 are expected to attend.

CFA Convention Set For November 11-13

The thirty third annual convention of the California Fertilizer Association will be held at the del Coronado Hotel, Coronado, California, on Sunday, Monday, and Tuesday, November 11-13. William E. Snyder of Los Angeles, president of the association, said that 600 persons are expected to attend from all over the United States and Canada.

Mr. Snyder stated that a good balance will be maintained between the business sessions and recreation with emphasis on entertainment for the men and their ladies who will attend.

The business session will be brief, but of importance to the industry, and will feature outstanding national authorities. The program committee in charge of arrangements is made up as follows—Frank Scoville, Chula Vista, chairman; Howard Conley, Los Angeles; and Thomas H. Lathe, Los Angeles.

Entertainment for the annual banquet and plans for the men's golf and bowling tournaments will be the responsibility of this entertainment committee: John Garretson, Chula Vista, chairman; Rod Taft, Los Angeles; and John Williams, Chula Vista.

Plans for the ladies' events will be developed by Mrs. John Garretson, Chula Vista, chairman of the ladies' committee, assisted by Mrs. Jack Baker and Mrs. Earle J. Shaw, both of Los Angeles.

Key to Pictures

1. The completed plant as it appeared in early January. Granulation unit in foreground.
2. The new Stedman ammoniator-granulator.
3. The existing plant as it appeared in early September when crew started wrecking solution tank shed.
4. The oil burner and combustion chamber at the end of the 5 ft. x 65 ft. counter current dryer.
5. Some of the end product bagged four months and three weeks after ground breaking.
6. G. O. McMillin and H. R. Krueger of Stedman examine some granular 5-20-20 four months and three weeks after ground was broken.

INDUSTRY CALENDAR

Date	Organization	Place	City
June 10-13	N?FI	Greenbrier	White Sulphur, W. Va.
June 28-30	Sou Control	Roanoke	Roanoke, Va.
June 28-30	Pacific N.W.	Chinook	Yakima, Wash.
July 18-20	SW Grade	Bucaneer	Galveston, Tex.
July 4-8	Eastern Canada	Mont Tremblant Lodge	Mont Tremblant, Que.
Oct. 19	Control Officials	Shoreham	Washington, D. C.
Nov 11-13	CFA	Coronado	Coronado, Cal.

FERTILIZER MECHANIZATION

Panel of Experts Agrees Many Improvements Needed In Application Equipment

Improvements in fertilizer application equipment are needed to help farmers save time and money, place the fertilizer where it will best feed the growing crop and cut costs of production per crop unit.

Thas was the consensus of opinion among panel members participating in the fertilizer mechanization conference held in connection with the eighth annual Midwestern Agronomists-Fertilizer Industry joint meeting at the Edgewater Beach Hotel, February 16 and 17. The meeting was sponsored by the Middle West Soil Improvement Committee.

Specifically, some of the panel members suggested that: 1—Boxes on applicators be made larger to carry more fertilizer and thus cut down the labor of frequent reloading; 2—Boxes should be put closer to the ground so farmers do not have to lift fertilizer bags so high; 3—Sharp edges, corners, clamps, etc., be modified to cut down accident hazards; 4—Equipment be designed to place starter fertilizer in the soil for corn and small grains where it can be readily reached by crop roots soon after germination; 5—Equipment be developed to help a farmer put in all of his soil treatments at the same time he is engaged in tillage operations to the minimum, cut costs and save the soil from compaction.

Men prominent in the fertilizer industry and in the college fields took part in the panel.

Panel members suggested that implement companies employ agronomists to work with and counsel with their engineers in planning and designing machinery for applying fertilizer.

The panelists were generally agreed that service, convenience, labor-saving and lower costs of application will be factors determining the greater or lesser use of solid fertilizers, liquids or bulk spreading in the years ahead.

They agreed, too, that starter fertilizers are still in the picture and will remain so, in addition to broadcast and plowdown applications for build-up and maintenance of soil fertility.

The panel was set up in a two-platoon system of four men each, with the first group presenting sum-

mary statements and the second answering questions.

Summary statements were presented as follows: "Solid Fertilizers", Dwight Sanders, director of research, Plant Food Division, Swift & Co., Chicago; "Complete Liquids", R. B. Ellsworth, president, Ellsworth Equipment & Engineering Co., Indianapolis; "Bulk Spreading", J. D. Cook, Illinois Farm Supply Co., Chicago; and "Fertilizer Placement", Dr. A. J. Ohlrogge, agronomy department, Purdue University.

Panel members participating in the question and answer period included: Vincent Sauchelli, chief agronomist, Davison Chemical Corp.; Dr. George E. Scarseth, director American Farm Research Ass'n.; Dr. George E. Smith, soils department, University of Missouri; and Dr. R. P. Thomas, service advisor, Plant Food Division, International Minerals and Chemical Corp.

D. A. Williams of the Minnesota Farm Bureau Service Co., St. Paul, Minn. was moderator of the conference. In opening the session, Williams pointed out that the conference's purpose was to help give the implement industry information that could help them plan and design equipment suited to today's farm needs and to keep pace with new developments in the fertilizer industry and changes in the size of farms.

Brief excerpts from the summary statement follow:

Dwight Sanders: . . . Granulation of fertilizer seems to be advancing more in the Midwest than in the Southeast. Estimates indicate that about 25 per cent of Midwestern fertilizer will be granulated this year . . . Moisture content of fertilizer is an important item from the equipment manufacturer's standpoint. Moisture content of plant food in the higher analyses is definitely on the downgrade, which is all to the good. Granulated materials normally run under 2 per cent moisture, which

is essential for prevention of caking in storage.

R. B. Ellsworth: Three years of experience in applying complete liquid fertilizers in the Midwest has brought forth important developments resulting in a satisfactory line of equipment for both custom and "do-it-yourself" use . . . It is the intention and duty of the liquid industry not only to provide complete liquid fertilizer to the farmer, but to make sure he has all the necessary equipment to save time and labor . . . A modified unit with a 500-gallon tank to hold 2½ tons of liquid fertilizer has been made available for ¾-ton pickup trucks. This unit is of particular interest to custom applicators and larger farm operators for their own use. This unit is also for broadcast operations. Pastures can be fertilized with these units, using drop pipes on the boom.

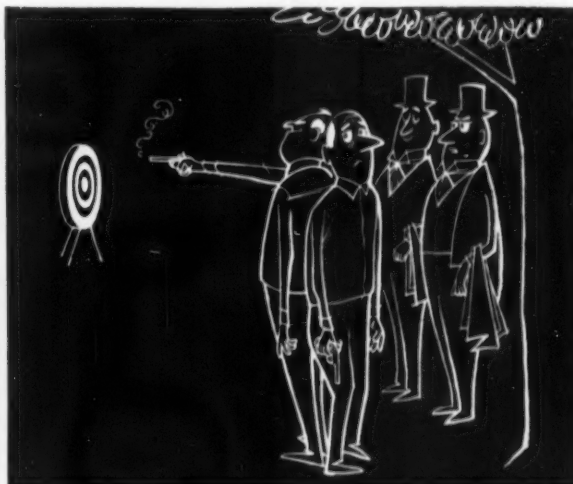
. . . Drawbar applicators for tractors essentially for the "do-it-yourself" farmer have been available for the past few years. . . The farmer will also have available corn planter attachments now for complete liquid fertilizer from implement manufacturers.

J. D. Cook: . . . In the present farm price squeeze, farmers who stay in business are those who will reduce the unit cost of crop production. Bulk spreading of fertilizer does help reduce the farmer's cost per acre of production. At the same time it helps the fertilizer manufacturer spread his cost per ton of production, because when you start spreading bulk materials, the farmer tends to buy more than when he had to apply it himself. . . More farmers have lost money from spreading a small amount of fertilizer than from a big amount. . . In bulk spreading of mixed fertilizers and straight materials, we recommend charging on a per ton basis rather than on a per-acre basis. If you apply 101 to 200 pounds per acre, charge at the rate

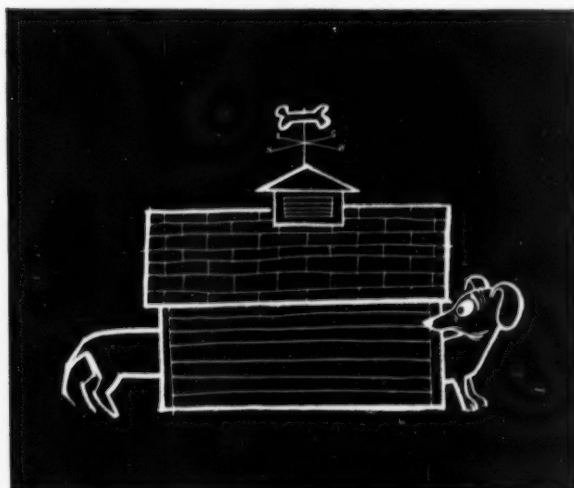
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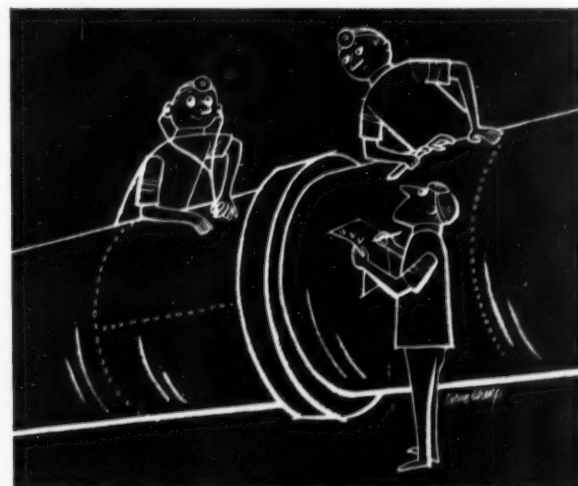
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of \$7 per ton; if you go up to 500 pounds per acre charge \$5.50 a ton.

A. J. Ohlrogge: . . . The root of a corn plant is not going to seek nutrients like a bloodhound. So you have to put the fertilizer where it will be intercepted by the roots. . . . Fertilizer placement involves putting the fertilizer in concentrated bands in the soil instead of spreading it through the entire soil. We have to think most of feeding the plant—getting it off to an early start. To do that we must get the fertilizer near the germinating seed. . . . Back in the earlier days of horse-drawn planters, the old boots on the fertilizer planter did a pretty good job when we used 2-12-6 fertilizer at about 75 pounds per acre. But we are getting into trouble now with fertilizer application rates going up and speeds of application increasing. Oftentimes most of the fertilizer lies above the seed—directly above, sometimes. It is fortunate to see that this year some implement companies are realizing this — many are coming out with single band disk applicators like shoes that will put the fertilizer in a single band, with some fertilizer-free soil in between the root and the plant food band. . . . Another problem in relation to Lister Corn planters in the Western Corn Belt is to get the band of fertilizer down beside the seed to properly feed the Listed corn. . . . In the old days when farmers were growing only about 50 bushels it didn't hurt too much if the crop was set back a little. But as a farmer goes up the productivity scale to 100 or 125 bushels per acre, he can't afford to have a slow-up of germination or emergence for even a short period, because he is pushing the plant for all the bushels it can produce. . . . The same thing applies to the wheat crop.

In the question and answer period that followed, panelists had this to say concerning a query, "Are there some simple changes in present equipment that you think would help?"

Dr. G. E. Smith: "I think a tremendous amount can be done with the present machinery to make it more usable. I believe that maybe some of the present faults have been responsible for farmers' interest in other methods of application. For one thing we can enlarge the box on the applicator to accommodate some of the heavier rates of fertilizer application. And how about those edges, sharp corners and clamps used to hold the lids on? I'm sure, too, it would be appreciated if the boxes could be lowered.

And methods could be developed

for putting the fertilizer on at the same time we do another farm operation. Let's keep those tractors off the fields as much as we can. And if we put fertilizer on at the same time we do another operation, we cut costs."

Vincent Sauchelli: In earlier days, implement manufacturers had a gripe because of the difficulty of designing equipment that would distribute the old powdered fertilizer accurately. This old type could not be distributed perfectly because it was inclined to lump. It had particles of different density, different size and it had no segregation. That fertilizer could not be applied with precision. Today the situation is different. The fertilizer industry has improved the physical properties of the product. It has granular products that fall more conveniently into a form convenient to use. And it is now possible for the implement manufacturers to do a better job in designing their appliances to achieve greater precision with application. I think what is needed today is for equipment people to realize this change; and I know that quite a number of them here for this meeting have done that.

R. P. Thomas: The fertilizer industry is undergoing quite a change in its products. We are changing the formulation. We are coming out with products somewhat different. I think we are going more and more toward a product such as Sauchelli mentioned here.

Question: "What will be the pattern of distribution of fertilizer broadcast versus row application?"

Dr. G. E. Scarseth: We have both. Broadcast applications by bulk and other methods can build up the fertility level, according to soil tests. Every once in a while you hear somebody say that if you get your soil fertility high enough, you don't need fertilizer in the row when you plant such a crop as corn. My private opinion is that I definitely want some fertilizer as a row application. . . . I want some starter fertilizer.

And in that row fertilizer I definitely want the emphasis placed on phosphorus. In common with some of the agronomists in Illinois and Iowa, I want that row phosphorus as available as possible. There is some evidence that when it is ammoniated phosphate, it helps for availability. Yes, in my book, starter fertilizer is a "must" for all corn fertilization to get the crop off to a fast start. . . . Bulk distribution and row application both are here. And I want to say to the implement manufacturers that

we do need improvements in row application. We are going to continue to have a lot of row application. So if you manufacturers are going to design improvements in your application equipment for the row, I would go along with Ohlrogge in getting it there by the seed—not right on the seed, but there on the side. And in my book I want it quite deep. If we place the fertilizer quite shallow it is not too effective in dry weather and it would keep down the rate of application and limit us as to the plant food added in the row. Let's keep on improving our fertilizer distribution equipment for the row. Let's make it simpler and easier. We need equipment to get rid of labor.

Question: What is the possibility of combining tillage with other operations?

G. E. Smith: We are approaching a stage where, I believe, we want to keep our tillage operations to a minimum. That is important in cutting the cost of operations. When we were getting only 40 to 50 bushels of corn per acre, maybe it didn't make too much difference whether we went out there with tractors, mashed the soil and got it all compacted. . . . So far as tillage is concerned you will find that those methods which increased yields the most depleted the soil the most. In other words, the tillage only made it possible to release more nutrients from the organic matter. Now we are not paying as much attention to the organic matter as we did before. That is the reason you fertilizer people are here. You are selling those nutrients. I think we need to develop some tools to keep our tillage operations to a minimum. Which means, also, that I think we should try to put all our soil treatments in at the same time. I believe that if you go out into the country, you will find a lot of ingenious farmers who are doing something in that direction.

It is probable that machinery manufacturers could learn a lot from them.

Panel members considered a number of questions, including: possible advantages of liquid fertilizer—convenience of application, rate of application; the problem of applying fertilizer evenly to fit the gravity picture; possibilities of use of liquid fertilizers for exact placement of nutrients; can liquid fertilizer compete with dry fertilizers on a concentration basis?; how about the cost of liquid versus complete solid fertilizer?; liquid versus straight materials?

MORE PAPERS FROM THE

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ATLANTA MEETING

CORN PRODUCTION

Nitrogen-Potassium Balance in Corn Production

F. L. Fisher and O. E. Smith
Texas A.E.S., College Station and Prairie View,
Texas.

Fertility studies conducted on Hockley fine sandy loam from 1951 through 1955 indicate that corn growing on these soils will respond to the application of phosphorus and potassium. Nitrogen response is dependent upon the balance between soil moisture, plant population and level of phosphorus and potassium in the soil.

The application of 60 pounds of phosphorus pentoxide (P_2O_5) to the acre will provide enough phosphorus for corn growing on these soils.

The amount of potash needed fluctuated between 60 and 120 pounds per acre, depending on soil moisture level through the growing season and plant population. With less than 60 pounds of K_2O per acre, corn yields decreased sharply and plant lodging increased. There appeared to be an almost perfect inverse relation between percentage of lodged plants and amount of K in the soil solution, up to about 40 ppm. Increasing the level of soil K above 40 ppm did not cause further reduction in plant lodging.

When other conditions were favorable, significant increases in yield resulted from the application of nitrogen up to 180 pounds of N per acre. Increasing the level of nitrogen increased plant lodging, unless at least 60 pounds of potash were applied. With sufficient potash, high amounts of nitrogen caused only very small increases in lodging.

The results of this study emphasize the necessity of proper N-P-K balance for high yields. Ample P and K must be put down at planting time if high amounts of nitrogen are to be applied later as side or top dressings.

Effect of Deep Placement of Fertilizer and Subsoiling on Corn Grown on Flatwood Soils

W. K. Robertson and J. G. A. Fiskel
Florida Agricultural Experiment Stations,
Gainesville

Lack of water at some time during the growing season limits corn yields practically every year in Florida. Deeper root systems would result in

a larger reservoir of water for plants and might carry the corn through short drought periods sufficiently to prevent any great decline in corn yields.

Conditions favoring shallow roots in Florida Flatwood soils are high fertility from fertilizing and liming the topsoil but low fertility of the subsoil and for some soils evidence of organic hardpans. It is hoped that unfavorable conditions for root growth in the subsoil can be alleviated by subsoiling and deep placement of fertilizer.

One year's data are reported for two flatwood soils. The Leon fine sand had a "hardpan" about 14 inches below the surface which was pierced by the subsoiler. The Ona fin sand had a "hardpan" near the surface which normal cultivation usually broke. Both soils had been cropped several years and had received lime and commercial fertilizer. They were located on the Dairy Research unit near Hague, Florida.

Treatments tested at each loca-

data on the Ona fine sand indicated that lime in the subsoil gave 18 bushels of corn over 60 in the check plots. These differences were significant. Chemical analyses of corn leaves at tasselling time as well as root distribution studies, indicated that the corn was feeding in the fertilizer band. Analyses of soil samples showed that calcium and potash was low in the profile of the Ona and Leon soils respectively while other major plant nutrients appeared to be adequate. Minor elements in the subsoil gave no significant yield increases on either soil.

* * *

Differential Response of Five Corn Varieties to Varying Fertility Levels in the Georgia Piedmont

H. D. Morris, A. A. Fleming, and
G. M. Kozelnick
College Experiment Station
University of Georgia
Athens, Georgia

Five corn varieties, including four hybrids and one open-pollinated variety, were grown on upland soil over a three year period. Four rates of fertilizer applied were: (1) none, (2) 250, (3) 500 and (4) 1000 pounds of 10-10-10 per acre. A uniform pop-

So many fine papers were presented at the joint meeting of the Association of Southern Agricultural Workers and the Southern Section of the American Society of Agronomy that we have spread them over several issues: last month, this month and there are more still to come.

tion were: subsoiling alone, subsoiling with fertilizer alone, or with lime alone, or with lime plus fertilizer, or with lime plus fertilizer plus minor elements, compared with surface fertilization at low and high rates. Dixie 18 corn was the indicator crop. In addition, uniform treatments were made of 400 lbs. of 4-12-12 at planting and of 40 lbs. of nitrogen as a sidedressing. To apply the fertilizer a hopper was mounted behind a Ford subsoiler. A tube led from the hopper to the foot for deep placement and a rolling wheel device was perfected to turn the hopper gears from traction against the soil. This made it possible to make definite rates of application at depths of 13 to 15 inches.

Check plots yielded 50 bushels of corn per acre on the Leon fine sand. Subsoiling alone gave 10 bushels of corn and fertilizer in the subsoil gave an additional 12 bushels. Yield

ulation of 12,000 plants per acre was utilized throughout the experiment. A randomized block split-plot experimental design was used with fertilization rates as whole plots and corn varieties as sub-plots. Treatments were replicated five times the first year and six times the second and third years.

Dixie 22 outyielded all other varieties at all fertilizer levels during the three year period while the open-pollinated variety was consistently the lowest yielding variety. The superiority of adapted hybrids to the open-pollinated variety was more marked during dry seasons and was greater at higher fertilization rates than at lower fertilization levels.

Adapted hybrids responded to each additional increment of fertilizer for all three years but the open-pollinated variety did not respond to fertilization during an extremely dry year and no additional response in



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yield was obtained from the highest fertilizer rate during a moderately dry year.

Increases in yield obtained from fertilization were due primarily to two factors: (1) an increase in ear size and (2) an increase in number of ears per stalk. Only a slight increase in shelling percentage of the corn was obtained above the 250 pound rate of fertilization.

Zinc Content of Some Kentucky Soils and of Corn Grown on These Soils

H. F. Massey
University of Kentucky

The total zinc content of thirty-five Kentucky soils was found to vary from 18 to 63 parts per million. The zinc extracted by the Shaw and Dean dithizone method ranged from 0 to 2.0 parts per million. Corn grown in the greenhouse on these soils and harvested at the end of five weeks contained from 8 to 30 parts per million zinc. The zinc content of the corn tended to increase with increasing dithizone-extractable zinc in the soil and to decrease with increasing pH of the soil.

Farm grown corn showing symptoms of zinc deficiency contained 6.5 to 11.0 parts per million zinc. Healthy corn from the same or adjacent fields contained 10 to 28 parts per million zinc.

The zinc content of the top leaves appears to be the best index of the zinc status of the plant. Stalks and midribs from deficient plants were found to be as high in zinc as those from non-deficient plants. The zinc content of the leaves of both deficient and healthy plants increased towards the top of the stalk, but the increase was much greater in healthy plants.

Contribution from the Agronomy Department,
University of Kentucky and published with the
permission of the Director of the Kentucky Agri-
cultural Experiment Station.

The Nematocidal Effect of Soil Fumigation on Corn Production at Homer, Louisiana

G. E. Wilcox, M. J. Fielding,
J. P. Hollis and D. M. Johns
North Louisiana Hill Farm Experiment Sta-
tion, U. S. D. A. Sec. of Nematology,
Plant Pathology Department, Louisiana State
University

Fumigation of a Ruston fine sand on which corn had been grown for three previous consecutive years proved to be beneficial to corn production at the North Louisiana Hill Farm Experiment Station, Homer, Louisiana. Prior to fumigation high populations of parasitic nematodes had been found in the soil of the experimental site, the lance nematode (*Hoplolaimus* sp.) and meadow

nematode (*Praetylechus zeae* Graham, 1951) being most prevalent.

With a Maclean fumigun, having a six-inch injection point, three nematocides were applied February 1, 1955, spaced on twelve-inch centers and at the following rates per acre: Dowfume W-85, 7 gal.; D-D, 25 gal.; and Nemagon, 3.5 gal. The fumigants were used at these high dosages to insure control of parasitic nematodes. The experiment consisted of treatments with the three fumigants and a non-fumigated control. It was laid out in a randomized blocks design with three replications.

Corn was planted March 16, 1955 in 40 inch rows. The corn on all plots was fertilized at planting with 3-12-12 at the rate of 300 pounds per acre and sidedressed on May 3 with 45 pounds per acre of nitrogen as ammonium nitrate.

The corn growth on the fumigated plots was more vigorous from the start. At the tasseling stage the corn on these plots averaged a foot taller than that on the non-fumigated plots. The plants on the non-fumigated plots had a lighter green color than did those of the fumigated plots. A severe deficiency symptom developed on plants in the non-fumigated plots that was attributed to magnesium deficiency. Crimson reddish stripes appeared in the tissue between the parallel veins of the older leaves. As the deficiency became more severe the tissue between the veins became necrotic. In contrast, the plants on the fumigated plots developed no apparent deficiency symptoms. A more extensive root system was noted on the plants of the fumigated plots.

All three nematocides gave excellent control of parasitic type nematodes, *Hoplolaimus* sp., *Trichodorus* sp., *Praetylechus zeae* and *Xiphinema americanum* Cobb, 1913.

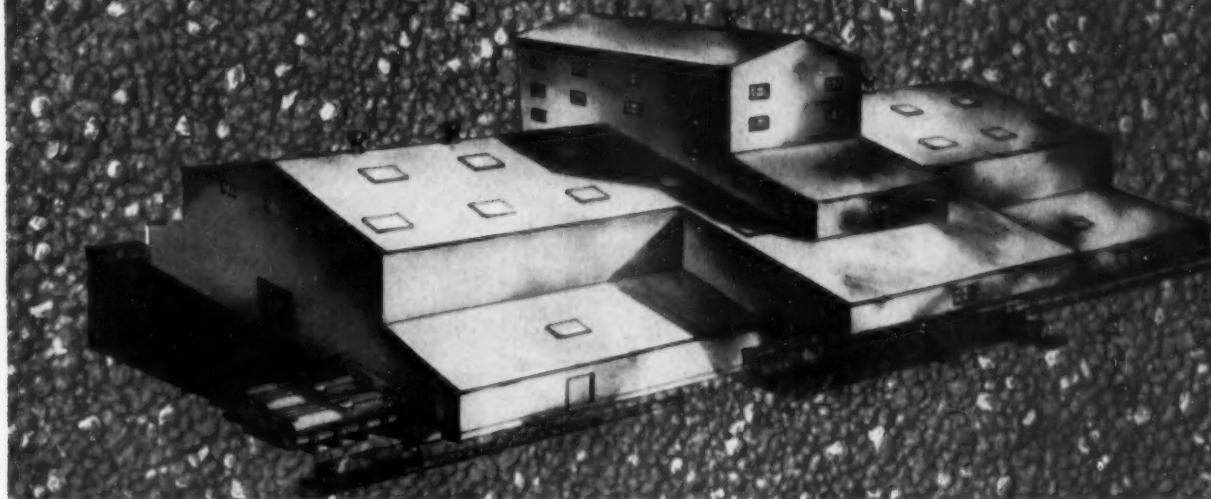
Soil fumigation increased the grain and stover yields significantly, but there were no differences amongst fumigants.

Chemical composition of the whole plant at the tasseling stage, of the mature stover, and of the grain revealed no differences in contents of N, P, K, Ca, Mg and Na between the non-fumigated and fumigated treatments.

Analysis of soil samples of the top six inches, collected after the corn was harvested, showed that fumigation had no effect on the level of available soil nutrients.

Where parasitic nematodes are prevalent, corn growth is detrimentally affected. High populations of nematodes, at the young-growth

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stages of the corn, attack the initial root system which is then limited in its ability to take up adequate amounts of nutrients for normal growth. Either scar tissue or the restricted root system results in a less efficient utilization of applied fertilizer and available soil nutrients by the plant; this effect is expressed as

decreased yields and sometimes also as mineral deficiency symptoms.

Fumigation kills or renders dormant the nematode population and allows the plant to develop a healthy root system thereby enhancing its ability to supply the plant needs for normal healthy growth.

COMPARISONS

Figure 1.—Comparison of phosphates in a 3-year rotation on a virgin Tilsit silt loam, Plateau Experiment Station, Crossville. 6-year averages except wheat which is a 2-year average.

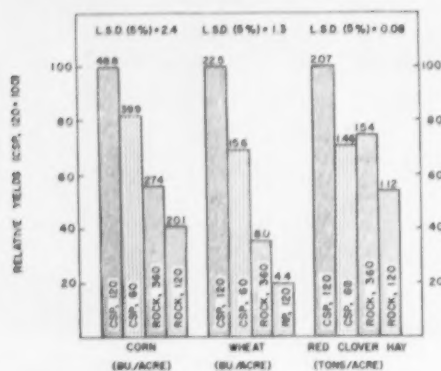


Figure 2.—Comparison of phosphates in a 3-year rotation on Decatur silty clay loam, Knoxville. 6-year averages.

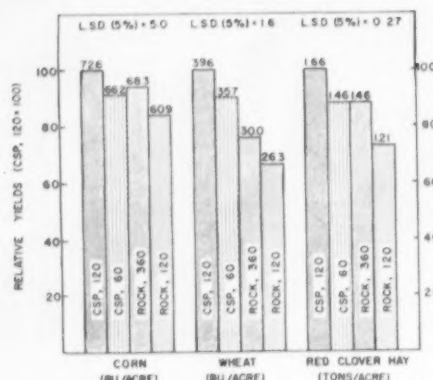


Figure 3.—Comparison of phosphates in a 3-year rotation on a Dickson silt loam, Highland Rim Experiment Station, Springfield. 6-year averages.

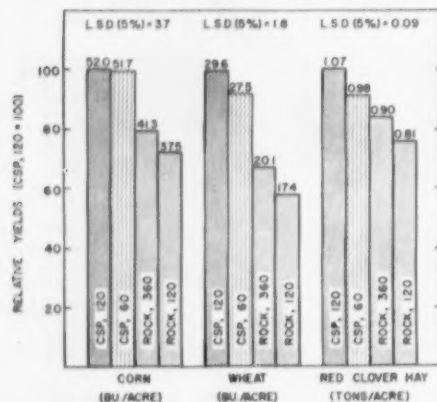


Figure 4.—Comparison of phosphates in a 6-year rotation on Pembroke Silt Loam, Lawrence County. 5-year averages.

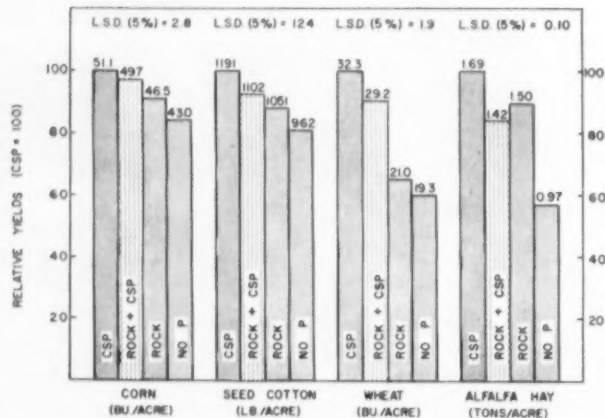


Figure 5.—Comparison of phosphates in a 4-year rotation on Dickson silt loam, Lawrence County. 5-year averages.

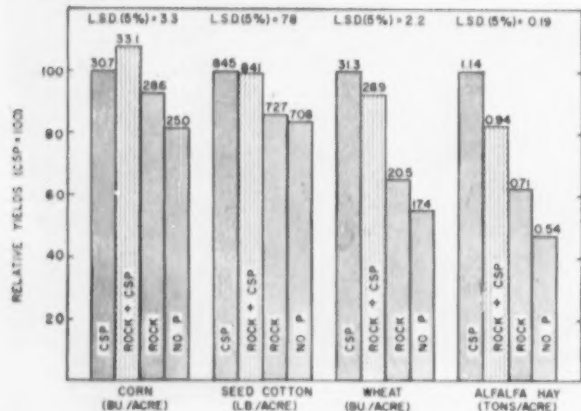
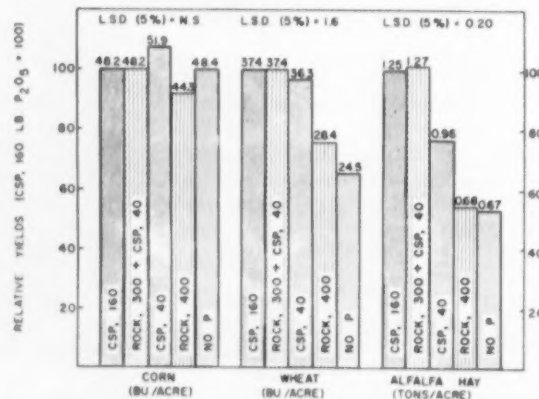


Figure 6.—Comparison of phosphates in a 4-year rotation on Dewey silt loam, Knox County. 3-year averages. (P₂O₅ rates are for 4-year period).



OF ROCK PHOSPHATE WITH SUPERPHOSPHATES IN CROP ROTATIONS

Rock Phosphate (RP) was compared with concentrated superphosphate (CSP) in 3- to 6-year rotations at six locations in three physiographic regions of the State. Corn, cotton, wheat, red clover, and alfalfa were the crops. All crops of the rotation were grown each year and each fertilizer treatment was replicated 3 to 6 times. Yield data and evaluations are based on periods up to 6 years.

The standard rate of application of CSP was 40 pounds of P_2O_5 per acre per year while RP was applied at a rate of $2\frac{1}{2}$ to 3 times that of CSP in terms of P_2O_5 . CSP was applied prior to the seeding of each crop; RP was applied broadcast once in the rotation cycle. Nitrogen and potash were applied to all treatments, including unphosphated checks, in equal and adequate amounts.

Crop yields obtained with RP were less than those obtained with CSP in all experiments. Assigning a value of 100 to the average yields obtained with CSP in the 6 experiments, the relative yield values of RP and unphosphated check were as follows: corn, 84 and 82; cotton, 87 and 83; wheat, 64 and 56; and red clover-alfalfa, 75 and 55. RP showed very

little or no improvement in relative performance with time.

In three experiments, RP was supplemented with small amounts of CSP (20 pounds of P_2O_5) applied to the non-leguminous crops. Such a combination treatment resulted in an improvement in yield over those obtained with RP alone, but with the exception of corn, yields were lower than those obtained with the standard CSP treatment.

At one location, an attempt was made to determine the separate effect of each phosphate in the RP-CSP combination treatment. Here, an additional treatment was included in which CSP only was applied to the same crops and at the same rate that it was used as a supplement in the combination treatment. The results indicate that, of the total increase in wheat yields attributable to the combination treatment, 88% should be credited to the CSP supplement.

The results obtained with rock phosphate in these and previous experiments have been such that the Tennessee Agricultural Experiment Station does not recommend it under present price conditions.

C. H. Long
University of Tennessee
Agricultural Experiment Station

Figure 7.—Comparison of CSP and rock phosphate on corn by years in a 3-year rotation of corn wheat, and red clover on virgin Tilsit silt loam, Crossville.

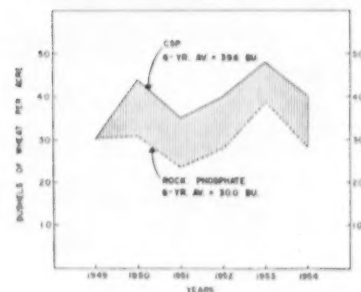


Figure 8.—Comparison of CSP and rock phosphate on wheat by years in a 3-year rotation of corn, wheat, and red clover on Decatur silty clay loam, Knoxville.

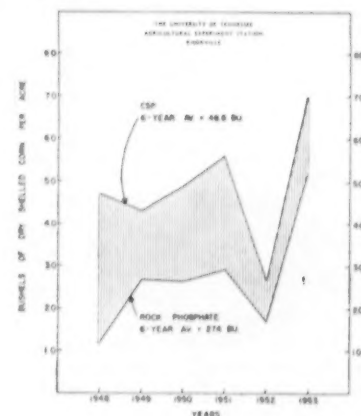


Figure 9.—Comparison of phosphates at two rates of liming in a 3-year rotation, Crossville. 6-year averages.

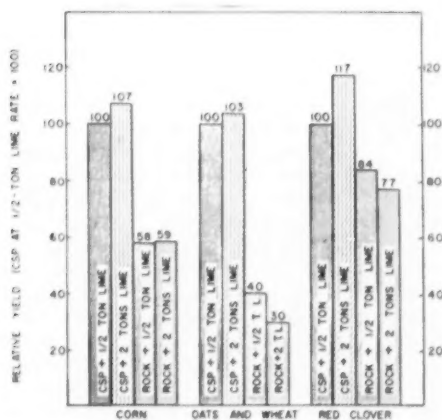
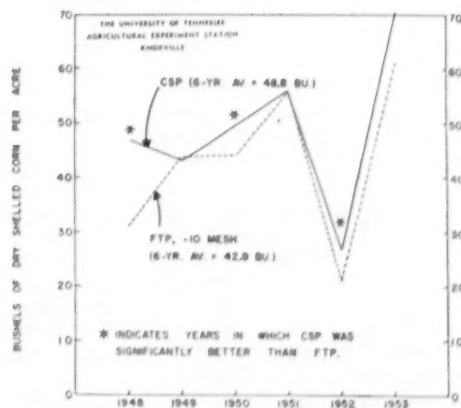


Figure 10.—Comparison of concentrated superphosphate and fused tricalcium phosphate on corn in a 3-year rotation of corn, wheat, and red clover, Crossville, 1948-1953.



SOIL SOLUBLE SALTS —AS AN INDICATOR OF NUTRIENT INTENSITY AND BALANCE

C. M. Geraldson
Gulf Coast Experiment Station

Man, by his lack of knowledge regarding nature's complex balance, has brought about a condition that has made it necessary for him to determine the balance required for his crops and find means of obtaining and maintaining it. All other factors being equal, plant growth is a function of the two variables of nutrition, intensity and balance. Modern agricultural practices which tend to increase fertility levels (intensity factor) are limited by increasing occurrences of problems caused by abnormal nutrient balances.

The soil solution contains salts which constantly vary as nature tends to establish an equilibrium in a dynamic environment. The breakdown of organic matter, the release of nutrients from the exchange complex of the soil, the addition of fertilizer and irrigation water supply salts to the soil solution. Salts are removed from the soil solution by leaching, by growing plants, by precipitation of certain salts, and the "fixing" of certain nutrients in the soil. A method has been developed to utilize the soil solution soluble salts (SSSS) as an indicator of nutrient intensity and balance.

The SSSS are determined from the saturation extract (obtained by vacuum filtration of soil paste that has been made up to a saturated condition by adding water while stirring) of the soil. Soluble salt measurements in terms of electrical conductivity are made with a conductivity bridge. The electrical conductivity can be converted to approximate ppm soluble salt by using an average salts such as potassium chloride for a standard.

The saturation percent for most Florida irrigated sandy soils that have a hard pan 18 to 24 inches below the surface is approximately twice the field capacity. However, non or infrequently irrigated sandy soils or those without hardpans will often have saturation percentages 3 to 4 times the field capacities and the appropriate multiple is used to calculate the concentration of SSSS at the normal field capacity.

Maximum amounts of SSSS tolerated by specific crops are gen-

erally known but very little work on minimum amounts has been reported. Higher fertility levels and correspondingly higher SSSS levels generally are associated with larger yields and optimum growth. An optimum range of SSSS for best yields and quality can be established if specific deficiencies and abnormal nutrient balances are avoided. For tomatoes, grown on Florida sandy soils, the optimum range of intensity has been found to be about 2000-3000 ppm SSSS calculated for field capacity.

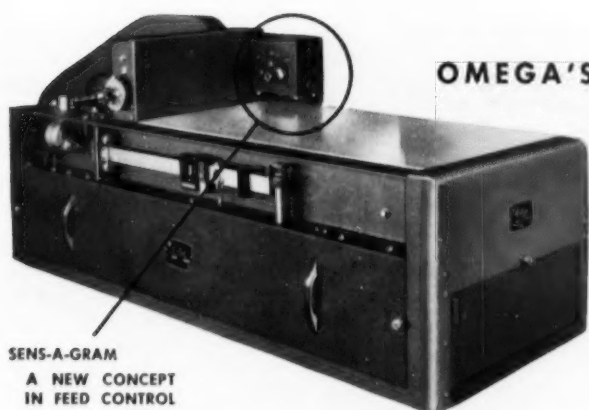
The value of an intensity range is limited by the prevalence and severity of deficiencies or abnormal balances. Specific deficiencies are in most instances not too difficult to detect, but very few conclusive studies of nutrient balances have been reported. The SSSS obtained in the manner described above can also be used to study nutrient balances. Specific cations or anions contained in the saturation extract are determined and reported as percent of the SSSS. In this manner, a study of nutritional balance, which has clearly shown calcium to be a key nutrient, was undertaken.

Calcium is not readily translocated (if at all) from older plant portions to young meristematic tissue. Therefore even a temporary deficiency in supply can often be associated with a specific plant response. Poor quality tomatoes, incidence of blossom-end rot of tomatoes and peppers and of blackheart of celery have been associated with a low Ca SSSS ratio. For tomatoes a calcium level which consistently remains above 20 percent has been found essential and necessary to avoid troubles associated with lower calcium levels. The percent Ca SSSS can be increased by additions to the soil solution of the more soluble calcium-bearing materials and can be decreased by additions to the soil solution of cations such as magnesium, ammonium, potassium and sodium. The percent of other cations or anions/SSSS can also be determined and ratios of specific cations or anions calculated. Observations and preliminary study indicate that at relatively low concentrations of SSSS, a high sodium/

calcium ratio is associated with blossom-end rot to a lesser degree than equivalent ratios of other cations to calcium. Moisture levels and movement in conjunction with lime and fertilizer usage are some of the more important interrelated factors which affect the Ca/SSSS ratio. Variations in metabolism, as well as rate of growth can also affect calcium requirement, uptake, translocation and assimilation. All of the above-mentioned factors must be considered when determining if the calcium supply is adequate for plant requirement.

The above-mentioned physiological disorders of certain vegetable crops (blossom-end rot and blackheart) have also frequently been associated with excess soluble salts. As salt concentrations increase the relative activity as well as solubility of divalent salts decrease at a more rapid rate than nonvalent salts. When SSSS concentrations are relatively high the method of measurement described above (percent Ca SSSS determined with the saturation extract) does not give a true indication of the Ca SSSS percent calculated at field capacity or the 'effective concentration' as it varies with relative activity. Regardless of whether this effect can be measured, calcium uptake by tomatoes, pepper and celery decreases as SSSS concentration increases and becomes an important supplementary consideration.

It is significant that all major factors frequently associated with the above-mentioned plant responses cause reductions in the Ca SSSS ratio regardless of whether or not it can be measured. It is also significant that regardless of the associated factor, foliar application of calcium, if properly applied, will prevent the abnormality. As a result of numerous tests and experiments it is concluded that the Ca SSSS ratio is a good indicator of the calcium supplying capacity of a soil. Soil tests, such as "pH" or "available calcium" cannot be considered good indicators of the calcium-supplying capacity. Plant tissue tests serve as good indicators of a calcium deficiency if a consistently low Ca SSSS ratio prevails, but are not good indicators if the low Ca/SSSS ratio is of a temporary



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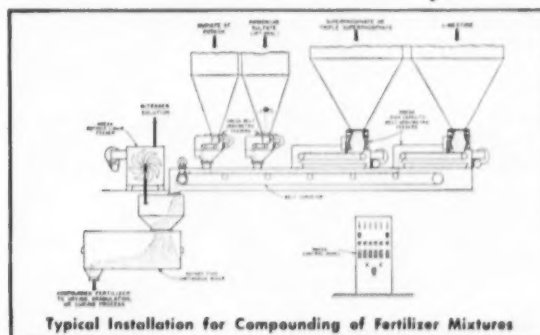
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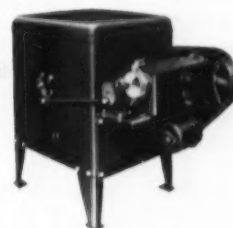
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SUMMARY

The soil solution soluble salt (SSSS) is used as an indicator of nutrient intensity; and specific nutrients determined as percent of the SSSS are used to study nutrient balance. The SSSS was found to be a good indicator of nutrient intensity if deficiencies or abnormal balances were avoided. The calcium/SSSS ratio was found to be a good indicator of the calcium-supplying capacity of a soil. Poor quality of tomatoes, blackheart of celery and blossom-end rot of tomatoes and peppers were associated with factors causing a low Ca/SSSS ratio regardless of whether or not the ratio could be measured.

The effectiveness of these tests as indicators of nutrient intensity and balance for these crops suggests that similar tests might be helpful with many other crops.

* * *

Effects Of Major And Minor Elements On The Production Of Clover-Pangola Hay Grown On Leon Fine Sand

John G. A. Fiskel and Tzu-Liang Yuan,
Gainesville, Florida

The results reported are from a field experiment begun in the summer of 1952 on Leon fine sand using a split-plot design. The main plots were high calcic limestone at 3000 (L₁) and 6000 (L₂) pounds per acre, superphosphate at two rates 60 (P₁) and 120 (P₂) pounds of P₂O₅ per acre.

Sub-plots within main plots were fertilized with minor elements, the full rates being 20 pounds per acre of copper sulfate, manganese chloride, zinc sulfate, and ferrous chloride; 10 pounds of colemanite and 1 pound of sodium molybdate.

Only one sub-plot received the full rate, the other treatments being one-half full rate, without manganese, or iron, or zinc, or molybdenum, or copper and boron only making 8 sub-plot treatments in all. Eight plots received no boron.

The Pangola grass which was planted the first summer has persisted over the three years. Hubam and ladino clover grew well in 1953, but only ladino established in 1954 and 1955. On the L₂P₂ plots particularly, clover lived over the year with poorest clover on the L₂P₁ plots and on the no boron plots.

The only nitrogen was supplied as ammonium nitrate at 50 pounds N in 1952 and 100 pounds N in July of

1953, the remainder of the nitrogen being from symbiotic fixation and thunderstorms. Magnesium sulfate was applied at the rate of 100 pounds per acre in 1952 and again in August, 1955.

Potassium was applied uniformly at 300 pounds per acre as sulfate of potash after each cutting was removed from the plots. Results are reported as oven-dry weights, as follows:

Average Yield Of Clover-Pangola Hay (tons per acre)			
Treatment	1953	1954	1955
L ₁ P ₁	9.66	5.49	4.90
L ₁ P ₂	9.55	6.03	4.62
L ₂ P ₁	9.38	5.80	4.23
L ₂ P ₂	9.00	6.15	3.82
Full m.e.	9.96	6.34	4.35
1/2 Full m.e.	10.25	6.48	4.26
Minus Mn	10.07	6.25	4.31
Minus Mo	9.90	6.08	4.59
Minus Zn	9.90	6.30	4.33
Minus Fe	10.30	6.06	4.80
Minus Cu	9.20	5.98	4.66
Only B	8.51	6.09	4.04
No B or m.e.	6.82	4.21	2.50
Cuttings	5	5	4
Rainfall, inches	73	37	42

Total nitrogen in hay produced in 1953 was 374 pounds of N per acre with all minor elements added and 348 were boron only was added to major element fertilization. In 1955 the full minor element treatment yielded hay containing a total of 164 pounds of N compared to 131 pounds with boron only, and 49 without boron.

Yields and nitrogen production in 1954 and 1955 reflect the degree of clover growth which was supplying most of the nitrogen to the soil. Otherwise, the minor elements supplied in 1952 along with the native supply and those being added unintentionally in the sulfate of potash and superphosphate, still appear adequate for this type of hay production.

* * *

Growth And Fruiting Of The Cotton Plant Under Controlled Environmental Conditions

W. F. Souce'l and R. D. Rouse
Alabama Polytechnic Institute
Auburn, Alabama

Cotton plants were grown in a 9' x 14' x 24' chamber in which light, temperature, and humidity were controlled. A light intensity of 2500 foot-candles in the vicinity of the plants was obtained with 70 8-foot white fluorescent and 48 40-watt incandescent lamps mounted on an overhead reflecting board. The first experiment was initiated with 12-hour alternating periods of light and darkness. The day temperature was maintained at 72° F. \pm 1°, with a relative humidity of 55% \pm 5%. The temperature gradually decreased to a minimum of 62° F. during the dark period.

Three weeks after seedling plants were placed in the chamber it was apparent that the internode length was less and leaf size larger than comparable plants growing in sunlight. One-half of the regular frosted madza lamps were replaced with blue lamps, and within four weeks the internode length and leaf size of the chamber plants were equal to those of plants growing in sunlight. Excellent vegetative growth and flowering were obtained under these conditions, but boll set and boll development did not occur. Combination of light periods of 12 and 18 hours with temperatures of 72 and 80° F. were used. Boll set did not occur at 72° F. with either 12 or 18 hours of light. At 80° F. with 12 hours of light some boll set occurred but development was below normal. However, excellent boll set and boll development did occur when the day temperature was maintained at 80° F. (dark decreased to 72° F.) with a light period of 18 hours. This indicates that a light-temperature inter-relationship is involved in the setting and development of cotton bolls.

* * *

Response Of Cotton To Rates Of N, P, and K At Eight Locations In 1955, As Related To Soil Test Values

J. T. Cope, Jr., L. E. Ensminger
R. D. Rouse, and C. E. Searsbrook
Alabama Polytechnic Institute A.E.S.

An experiment on rates of N, P, and K for continuous cotton was started at eight locations in Alabama in 1954. The rates range from zero to 100 pounds of each element in 20 pound increments. Rates of each element are varied while the other two are held constant at levels considered to be adequate. Lime is also included as a variable. Yields in 1955 were good, the average of the highest yielding treatment at the eight locations being 1987 pounds of seed cotton. Yields are reported here for 1955 only, since the season was highly favorable for responses to fertilization.

Large responses to N occurred at four locations. The average increase from 60 N at these four locations was 1008 lb. seed cotton. The other four locations produced much smaller increases, or none at all. Only one location produced a response to more than 60 N.

Response to P occurred at only two locations. The average response at these two periods to 60 P₂O₅ was 399 pounds seed cotton. No location responded to more than 60 pounds. Soil tests on soils that responded to



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phosphorus showed one to be low and one medium. Of soils not responding, three tested high, one medium, and two low in P.

Four of the eight locations produced responses to K. Average response of these four to 80 K₂O was 1053 pounds seed cotton. All four of these soils which responded tested low in K. The four soils showing no response to K all tested medium in K.

Lime increased yields at five locations. The average response to lime at these five locations was 108 pounds of seed cotton. Two locations showed little or no response and at one location yield was reduced 283 pounds by lime.

Effect Of Seed And Fertilizer Placement On Establishment Of *Sericea Lespedeza*

O. I. Hunt, C. W. Gantt, Jr.,
W. C. Hulburt, and R. E. Wagner*

The uncertainty of stand establishment is a serious obstacle in the production of forage crops. It has been one of the principal contributing factors to low production and poor quality of pasture and hay plantings. The cost of these stand failures has been high, yet the problem received little serious attention until recent years.

Experiments on the establishment of *sericea lespedeza* were initiated at Beltsville, Maryland, in 1953 as part of a cooperative program with various states in the Southeast to study seeding methods and principles. Previous work on other species at some state experiment stations and at Beltsville, Maryland, indicated real promise for improving existing seeding practices and eliminating some of the hazards common to forage establishment.

Seedings of *sericea lespedeza* alone and in combination with orchardgrass were made in the late spring of 1953, 1954, and 1955 on Keyport and Leonardtown silt loam soils of low fertility which had not been cropped for several years. Soil moisture was extremely limiting following the 1953 and 1954 seedings, but excellent moisture conditions prevailed after the 1955 seedings.

Factors considered in these experiments included drill versus

broadcast seeding, broadcast versus band placement of fertilizer, fertilizer rates and ratios and seed rates. Establishment was evaluated on the basis of number of seedlings emerged, early seedling development, survival, and dry matter yields.

Results of the 1953 and 1954 studies were almost identical. Best establishment was obtained where the seed was drilled and a complete fertilizer broadcast. Drill seeded plots gave approximately 130 percent better stand and significantly greater yields than comparable broadcast seeded plots where the fertilizer was broadcast in both cases. In both the 1953 and 1954 studies, damage to young seedlings from band placement of all fertilizers except phosphate was indicated. Dry matter yields in the second year, however, were about the same from band seeding (drilling the seed at a ¼-inch depth directly above a band of fertilizer placed 1 to 1 ½ inches deep) as from drilling the seed and broadcasting the fertilizer even though initial stands were 200 percent lower in the former. This indicates a response in vigor of plants to banded fertilizer in the second year.

In the 1955 experiment, initial emergence was exceptionally uniform. There were no differences in numbers of plants emerged due to treatment except in the case of seeding rates. However, highly significant differences between treatments were obtained in early growth and development of both the *lespedeza* and orchardgrass as measured by height of *lespedeza* and number of tillers in orchardgrass. Equally good growth responses were obtained with a complete fertilizer banded one inch below drilled seed and with phosphate fertilizer banded one inch below or in contact with drilled seed. Nitrogen and potash fertilizers alone or in combination placed one inch below drilled seed resulted in poorest development. Seedlings showed little initial response to fertilizers placed one inch below and one inch to the side of the seed in 1955 (a season with ample moisture). This treatment was not included in the 1953 and 1954 seedings.

The results of these experiments further emphasize that stand establishment should be evaluated on the basis of rate of seedling development as well as stand counts and yields. In many situations, some measure of rate of seedling development is more important than initial numbers of plants.

A Preliminary Report On The Effect Of Crop Rotation On Peanut Yields, Soil Fertility And Disease And Insect Populations

F. H. Reid, E. T. York, Jr.,
W. E. Cooper and
J. R. Dogger
N. C. State College

An extensive rotation experiment in which peanuts are the recurring crop was initiated in 1952. Cropping sequences of one, two, three and four years duration, which include all crops commonly produced in the Peanut Belt of North Carolina, have been followed.

During the last three years, peanut yields were lower from continuous peanuts plantings than from all the two year rotations except the wheat with *lespedeza*-peanuts rotation.

Peanuts grown in two year rotation with corn, cotton, or soybeans consistently produced higher yields than peanuts grown in rotation with tobacco or wheat with *lespedeza*. Yields of peanuts grown in three year rotations were greater than those grown in two year rotations. Soil fumigation to control rootknot nematodes (*Meloidogyne hapla*) (Goeldi) Chit.) plus application of aldrin to control southern corn rootworm (*Diabrotica undecimpunctata howard*: Barber) increased yields in each of the last three years.

Potassium levels of the surface soils of all rotations have been increased by applications of muriate of potash. Potassium has tended to accumulate in the subsoil with continuous peanuts and in the surface soil of the peanut-corn rotation. In the continuous peanuts, corn-peanuts and cotton-corn-peanuts rotations, 39, 66, and 47% respectively, of the added potash was retained in the upper 36 inches of the soil as increased exchangeable K.

Differences in peanut yields between rotations were partially due to the effect of the rotation on southern stem rot (*Sclerotium rolfsii* Sacc.). Although southern stem rot was only ½ as severe in 1954 as in 1955, the effects of rotations were very similar. Peanuts with winter cover crop and peanuts grown in two year rotations with soybeans, corn, wheat with *lespedeza*, cotton or tobacco had 62, 47, 19, 18, 18, and 12% respectively as many infected plants as continuous peanuts in 1955. Soybeans were also severely infected. The longer rotations generally had less stem rot than the shorter rotations.

* Research Agronomist, Field Crops Research Branch; Assistant Agricultural Engineer, Senior Agricultural Engineer, Agricultural Engineering Research Branch; Research Agronomist, Field Crops Research Branch; Agricultural Research Service, U. S. Department of Agriculture. Assisting in these studies was the Soil and Water Conservation Research Branch (Eastern Soil and Water Management Section, Beltsville, Maryland).

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Due to low and uneven original infestation, the rotational effects on *M. hapla* have not been clear cut. Only the two continuous peanut rotations resulted in damaging populations.

Southern corn rootworm injury has tended to decrease in the soybean-peanut rotation and to increase in the wheat lespedeza-peanut rotation when compared with damage suffered during the first year of the test when peanuts followed corn.

Fruit Quality Of Peanuts As Affected By Source Of Ca, Ca Level In Soil And Type Of Colloid

A. Mehlich and A. Perry
North Carolina State College

Fruit quality of peanuts is greatly influenced by calcium. The accessibility of a readily available source of Ca in the vicinity of the developing pods is of considerable importance. To supply these needs, it is a general practice to apply 400 to 500 pounds calcium sulfate per acre. It is known, however, that exchangeable Ca may likewise serve as a source of Ca. For this form of Ca to be of benefit its percentage saturation, total Ca level and type of colloid play an important role.

The significance of these interrelationships has been investigated at 40 locations scattered over the principal peanut producing areas in North Carolina. The soil properties measured were: exchangeable Ca, Mg, K, cation exchange capacity, anion exchange capacity, pH and organic matter. Supplementary sources of Ca were calcium sulfate (gypsum) and in some cases calcitic lime, dolomitic lime (38% $MgCO_3$) and 15% $MgCO_3$ -85% $CaCO_3$ mixtures. As a measure of type of colloid the cation exchange-anion exchange capacity (C/A) ratios, supplemented in some cases by x-ray and differential thermal analyses, were used.

The principal results obtained were: 1) land plaster failed to increase fruit quality of peanuts when the percentage Ca saturation was greater than 35, 2) the beneficial effects of land plaster increased with decreasing percentage Ca saturation for soils having approximately the same cation exchange capacities, 3) response to land plaster increased with decreasing Ca level or decreasing cation exchange capacity, 4) the percentage Ca saturation required for optimum fruit quality decreased with decreasing C/A ratios, 5) source of lime had no significant influence on fruit quality although the calcitic

lime tended to be slightly superior, 6) the usefulness of an equation to predict, from soil analysis data, the percentage Ca saturation necessary for optimum fruit quality is indicated.

* * *

Soil Phosphorus And Its Fractions As Related To Response Of Sugar Cane To Fertilizer Phosphorus

D. S. Byrnside, Jr. and M. B. Sturgis
Louisiana A.E.S.

Efforts to correlate dilute acid soluble or Troug phosphorus with the response of sugar cane in Louisiana to fertilizer phosphorus have met with much difficulty. In the older soils the dilute acids used failed to extract proportionately as much soil phosphorus as the crop roots absorbed.

The purpose of this study has been to measure the values of absorbed, organic, and total phosphorus in addition to dilute acid soluble phosphorus by various methods, and to evaluate the results in relation to the growth of sugar cane. Phosphorus extracted from the soil by 0.10 N HCl and 0.33 N NH_4F better characterized the amount of available phosphorus than the simple dilute acid soluble methods.

The absorbed phosphorus should be taken into account in determining the probability of a soil responding to fertilizer phosphorus. The absorbed phosphorus is of particular importance in evaluating the available phosphorus in soils of the Oliver, Richland and Baldwin series. It is much less important in estimating the available phosphorus in soils of the Commerce and Mhoon series. In these soils low in total phosphorus, organic phosphorus makes up a high per cent of the phosphorus, but the organic phosphorus contributes relatively little available phosphorus.

* * *

Soybean Inoculation Studies In Florida

Lewis W. Erdman¹ and George D. Thornton²

This paper presents results of two inoculation experiments at the Florida Suwannee Valley Experiment Station in 1954. One was a strain variation study in which ten single strains of *Rhizobium japonicum* and a mixture of the ten strains were tested on Jackson soybeans. The other was one of a series of uniform

legume inoculation experiments using Roanoke soybeans and including variables of source of inoculant, method of application, and nitrogen at seeding.

Six of the ten single strains of *Rhizobium japonicum* were significantly better than the uninoculated check. One strain from the U.S.D.A. collection was outstanding, producing a yield increase of 123 percent over the check. Four other effective strains produced increases ranging from 53 to 91 percent over the check. A mixture of all strains showed an increase of 83 percent. Two strains were ineffective, one apparently being parasitic, on Jackson soybean plants.

Inoculation increased the yields of Roanoke soybeans 81 percent over the uninoculated, no nitrogen, check treatment. Ammonium nitrate at the rate of 34 lbs N/acre had no effect on the inoculated soybeans but with uninoculated soybeans there was a slight but significant increase from this amount of nitrogen. There was no benefit from using syrup with the inoculant, and doubling the amount of inoculant did not produce any significant difference in yield of soybeans.

These studies emphasize the importance of inoculation for soybeans at this station, and particularly the need for more effective strains of *Rhizobium japonicum* to increase yields of soybeans group in Florida.

Georgia PFES Issues Corn And Cotton Material

The most recent publication by the Georgia Plant Food Educational Society is a folder entitled "Growing Corn" and written by J. R. Johnson, associate agronomist and J. Frank McGill and W. H. Gurley, assistant agronomists of the Georgia College of Agriculture. These are made available at \$25 per thousand. A 14 x 21 inch cotton poster is available at \$30 per thousand from Sam Burgess, Publications Editor, UofGa AES, Athens.

Link-Belt Folder Describes New Idler

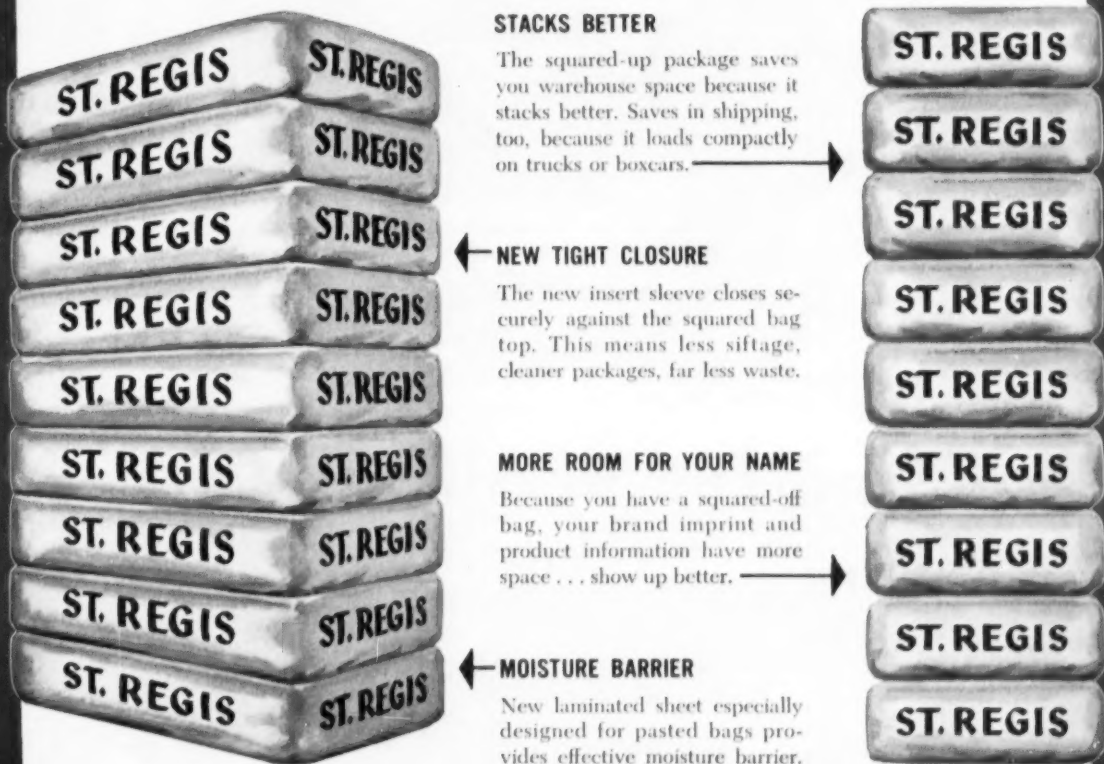
The new Link-Belt Series 50 ball bearing belt conveyor idler, which offers economic advantages in both original investment and operating requirements, is described and pictured in Folder 2516.

For a copy of Folder 2516, write to Link-Belt Company, Dept. FR, 307 North Michigan Avenue, Chicago 1, Illinois.

¹ Bacteriologist, Agr. Res. Service, U. S. Dept. of Agriculture.

² Soil Microbiologist, Florida Agricultural Experiment Station.

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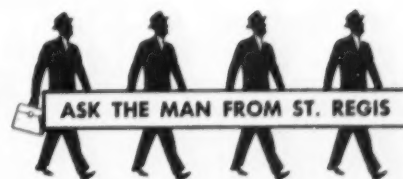
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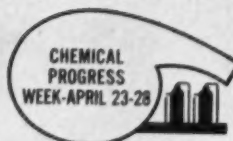


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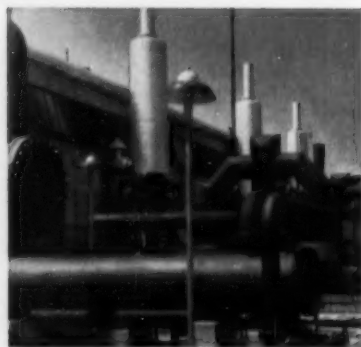
Mike Simpson (left) is owner of Mike Simpson Fertilizer Co. His son, Mike Jr., is general manager.



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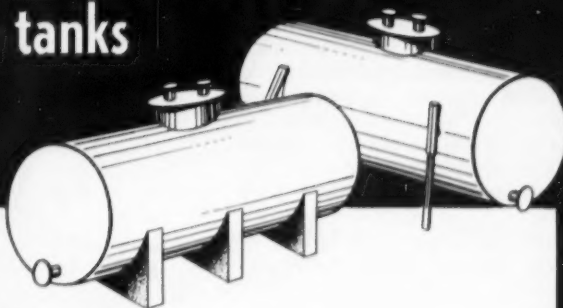
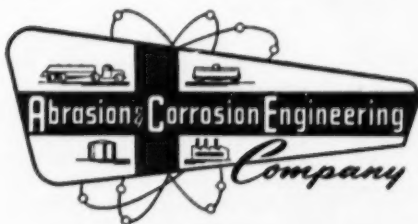
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Does Nitrogen Fertilizer Retard Legumes?

C. Y. Ward, R. E. Blaser, and C. I. Rich
Virginia Polytechnic Institute, Blacksburg

Field data show the effect of three levels of nitrogen and potassium upon the seasonal and total yields and percentage botanical composition, of alfalfa when grown in association with orchardgrass. Nitrogen was applied as ammonium nitrate at rates of 0, 25 and 50 lbs.; Potassium was applied as muriate of potash at rates of 0, 50, and 100 lbs. K₂O. The seasonal and total yields of alfalfa decreased with increases in nitrogen fertilization. The percentage of alfalfa in the botanical composition was influenced by addition of both nutrients; increasing with additions of K₂O and decreasing as the nitrogen was increased. These results indicate that the use of nitrogen fertilizers on alfalfa orchardgrass swards may depress the stand and subsequent yield of alfalfa.

* * *

How Large Amounts of Nitrogen Are Utilized By Coastal Bermuda Grass

F. L. Fisher
Texas A & M College
College Station, Texas

Nitrogen is the key to profitable production with Coastal Bermudagrass, provided there are adequate amounts of water, phosphorus and potassium present. Approximately 2.5 pounds of protein was produced for each pound of nitrogen applied up to a rate of 175 pounds of nitrogen per acre per harvest, 4 to 6 weeks.

Under the climatic conditions at College Station, Coastal Bermudagrass starts growing in March and will continue to grow up to November or about 230 days. An average production of over 100 pounds of hay per acre per day, with a maximum of 200 pounds per day during June and July, has been obtained.

Irrigation studies with Coastal Bermudagrass conducted near College Station indicate that the removal of nutrients from the soil will be high under hay production. During the two years, 1954-55, the annual nutrient removal in harvest forage was about 600 pounds of nitrogen (N), 130 pounds of phosphorus pentoxide (P₂O₅), and 300 pounds of potash (K₂O) per acre.

These studies also indicate that one can expect to recover in the harvested hay about 5 pounds of nitrogen, out of each 8 pounds added as fertilizer, this recovered nitrogen will be largely in the form of protein. These recovery ratios for phosphorus and potash were about 4 of 10 and 7 of 10, respectively.

Coastal Bermudagrass can utilize large amounts of fertilizer if it is supplied with about 1½ - 2 inches of water a week. This amount varies slightly with temperature, day length and relative humidity, but probably never drops below 1 inch and will rarely exceed 2 inches per week. This study, along with others, indicates that for a plant to make good use of the water available it has to be properly and adequately fertilized.

Coastal Bermudagrass growing under natural rainfall on a soil low in fertility produced about a ton of hay for each 25 to 30 inches of rainfall during its growing season. The application of 200 pounds of nitrogen (N) in combination with 100 pounds each of phosphorus pentoxide (P₂O₅) and potash per acre resulted in a ton of hay for each 8 to 10 inches of rainfall. By the use of 600 pounds or more of nitrogen, along with adequate amounts of phosphorus and potash, 4 inches of water will produce a ton of hay.

* * *

Effect Of Nitrogen On The Palatability Of Coastal Bermuda Grass¹

Glenn W. Burton, B. L. Southwell, and
J. C. Johnson, Jr.²

The effect of nitrogen and age of growth upon the palatability of Coastal Bermuda grass was studied in 1955 by applying the following treatments to a five-year-old sod of Coastal Bermuda growing on a Tifton sandy loam soil.

Nitrogen from ammonia nitrate at rates of 0, 50, 100, 200, 300, 400, 600,

¹Cooperative investigations at Tifton, Ga., of the Field Crops Research Branch and A. F. H. Research Branch, A. R. S., U. S. D. A., and the University of Georgia Coastal Plain Experiment Station, Tifton, Georgia. The authors gratefully acknowledge the assistance of E. H. DeVane and Gordon M. Prince, formerly Research Agronomists, U. S. D. A. and the University of Georgia Coastal Plain Experiment Station, and F. E. Knox, Biochemist, A. F. H. Research Branch, A. R. S., Tifton, Georgia.

²Principal Geneticist and Animal Husbandman, U.S.D.A. and the University of Georgia Coastal Plain Experiment Station, and Associate Animal Husbandman, University of Georgia Coastal Plain Experiment Station, Tifton, Georgia, respectively.

900, 1200, and 1500 pounds per acre was applied half on March 17 and half on July 14 to 6 x 20 foot plots. P₂O₅ and K₂O were applied at rates to make a 2-1-2 ratio, known to be more than adequate for these elements.

Within each of the four replications, 10 whole plots receiving the complete series of N treatments and arranged at random were clipped at two-week intervals and 10 others similarly fertilized and arranged were clipped at four-week intervals, a technique that Dr. Roger E. Blaser and his associates have used and may have originated.

On the four-week cutting dates, yields were taken from each plot by cutting a 26-inch strip through one side of the plot. On the first three dates, a herd of 20 cows and calves that had been grazing Coastal Bermuda were given free access to the plots for about two hours. They were then removed and another 26-inch strip was cut in each plot close to the previous strip.

The difference between the first and second yields expressed in percent of the first gave the percent of the forage consumed and was considered on index of its palatability. On the fourth cutting period, three Jersey cows were allowed to graze the plots until all were grazed closely, observations being used to indicate the early treatment preference of the animals. In the last cutting, one Jersey cow was allowed to graze the area for two days before the second cutting was taken. Yields and dry-matter percentages were obtained for all five cuttings and protein content was determined for the August 3rd clipping.

The data from this study revealed that the percentage of forage consumed increased as the nitrogen rate increased from 0 to several hundred pounds of N per acre. There was no evidence to indicate that the heavier rate, 1500 pounds of N per acre, reduced the palatability of the grass as measured in this test. When rainfall allowed for appreciable differences in yield in the two- and four-week-old grass, the cows showed a significant preference for the younger grass.

Increasing the nitrogen rate increased the yield, moisture, and protein content of the forage. Moisture-content increases stopped with 400 pounds of N per acre. Yield increases stopped with the 900-pound-per-acre application of nitrogen. The two-week-old forage from plots receiving 1500 pounds of N per acre contained, on August 3, 25.5% protein.



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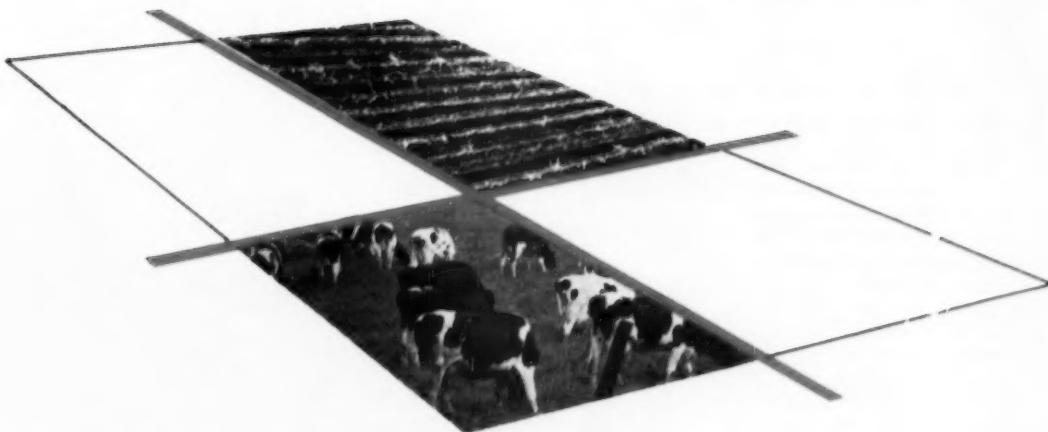
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Chemical tests revealed that only .005% of the nitrogen in this forage was nitrate nitrogen.

Dry Matter Yield And Relative Palatability Of Five Grass Species When Fertilized With Different Rates Of Nitrogen

T. H. Taylor, R. E. Blaser, W. H. Skrdla, and R. C. Hammes, Jr.
Virginia A.E.S., Blacksburg, Virginia

Virginia commercial orchardgrass, smooth bromegrass (southern strain), commercial timothy, certified Ky 31 fescue, and Kentucky bluegrass were sown in sod plots, in the fall of 1949, at the Northern Virginia Pasture Research Station, Middleburg, Virginia. The 5 grasses, each with 3 levels of nitrogen fertilizer, were replicated 6 times with individual plot size being 15 by 30 feet. Uniform high levels of phosphorus and potassium were maintained during the course of the experiment. Beginning in 1950, each grass received 35, 70, and 140 pounds of elemental nitrogen per acre per year. Each rate was applied in split applications during the growing season.

Eleven grazing trials were conducted with beef cattle during the 3 year period, 1950-52. The technique used was to fence each replication, harvest 2 herbage strips per plot before grazing, graze the uncut herbage until at least one plot had been grazed to a height of approximately 3 inches, remove the animals and harvest 2 more herbage strips per plot. The difference in dry matter between the before-grazing sample and the after-grazing sample was used as a measure of palatability.

Results of the 11 grazing trials indicate that orchardgrass and timothy were consistently more palatable than tall fescue, Kentucky bluegrass, or smooth bromegrass. Plots receiving the high rate (140 lbs. of N per acre) of nitrogen fertilizer were the most palatable, the medium nitrogen rate (70 lbs.) intermediate, and the low rate (35 lbs.) least palatable. A grass times nitrogen interaction occurred in 2 of the 11 trials conducted. Other factors that appeared to affect palatability were: individual animal preference, previous diet and degree of fill of the animals when offered a choice of foods, and the presence during the grazing trial of outside disturbances such as small fenced enclosures, heel flies, people, and unfamiliar animals. The experimental error, no doubt, was appreciably increased by one or many of these factors.

Dry matter production was meas-

ured over a 4 year period, 1950-53. The average seasonal yields of weed-free herbage in pounds per acre were: tall fescue 3794, orchardgrass 3461, Kentucky bluegrass 2957, bromegrass 1999, and timothy 1888. Studies of timothy and bromegrass deteriorated during the course of the experiment; however, good to excellent stands were maintained with the other grasses.

The Movement Of Nitrate Nitrogen In Columns Of Coarse-Textured Soil Materials

Thomas E. Bates and Samuel L. Tisdale*

The movement of nitrate nitrogen through columns of coarse-textured soil materials, as related to the quantity of percolating water and the porosity index of the soil, was studied in a series of laboratory experiments. Eight different soil materials were collected from the Coastal Plain region of North Carolina. The textural class of these materials varied from a loamy sand to a coarse sand. The materials were screened and placed in sectioned glass columns approximately 3 feet long, the inside diameter of which was 4.4 cm. The length of each individual section was 7 cm.

The soil in each of the various columns was wetted and allowed to come to equilibrium, a tension of 10 cm of water being applied to the bottom of each of the columns. Ni-

trate nitrogen was then added at the top of the column and different quantities of water were allowed to percolate through the different columns. The columns were then dismantled and the distribution of nitrate nitrogen was determined.

A so-called porosity index for each of the soils studied was determined. This porosity index is equal to a constant + the pore space drained from 0 to 50 cm tension, divided by the total pore space.

The distribution of nitrates throughout the column was then related to the quantities of water added and to the porosity index previously mentioned. It was found that the relationship which existed could best be described by the following equation:

$y = -121.93 + 64.66x_1 + 5.87x_2$
where y = mean movement of nitrate in cm

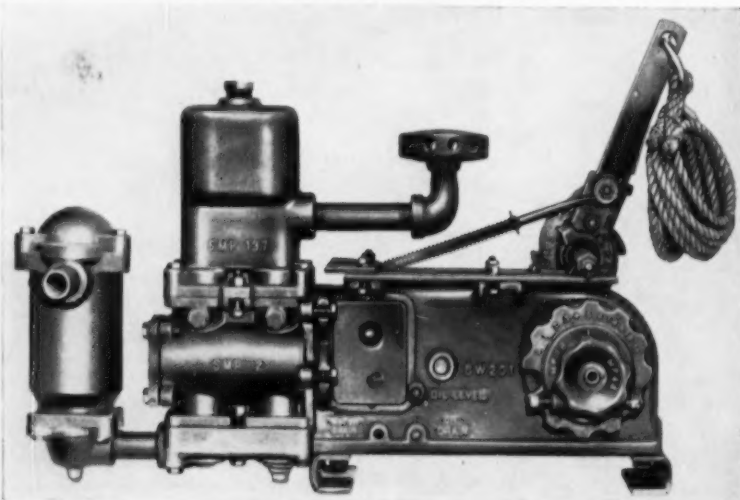
x_1 = porosity index

x_2 = (porosity index) \times (quantity of water added)

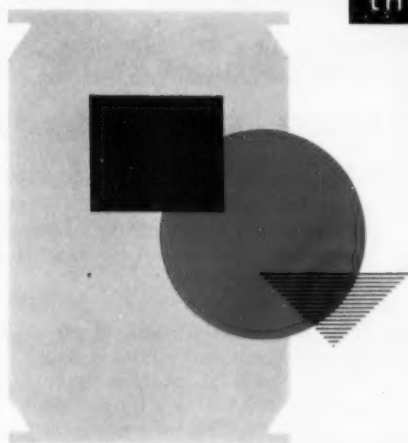
While all of the soil materials studied fell within a relatively narrow textural range, the movement of nitrate nitrogen through these soils in response to additions of the same quantity of water varied rather widely. This suggests that small changes in the textural class may markedly alter the movement of this form of nitrogen, and suggests further that the movement of this ion through soils may not always be as great as one would anticipate from a knowledge only of the textural class of the soil in question.

* Graduate Student and Professor of Soils, respectively, North Carolina State College, Raleigh.

Designed specifically for application of liquid fertilizer solutions by sub-surface or surface injection, this new solutions metering pump has been developed and marketed by the Dempster Mill Mfg. Co. of Beatrice, Nebraska. The new pump, Model S, is a companion to the Liquijector anhydrous ammonia applicator pump produced by Dempster last year. It can be used with the Dempster Model S (solutions) Liquijector or similar type applicator. Simplicity in setting and operation is a feature of the new pump, in addition to its unique positive double-acting piston type which permits greater accuracy and more capacity. On a Dempster applicator, the pump can deliver accurately within a range of from 6 to 75 gallons of liquid solutions per acre, on a swath from 80° to 280°.



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Around the Map

ARKANSAS

Duncan, Dieckman, Duncan Mining Co., St. Louis, have announced that their new mill near Mena, for the upgrading of manganese is complete and in operation. The concern has 52 claims in the Ouachita Mountains which constitute a large reserve of ore.

CALIFORNIA

West End Chemical, Westend, and **Stauffer** are working on a merger of the two. Stauffer already owns some 37% of West End preferred, and 16% of the common. West End, controls one of the largest borate deposits in the US, and has annual sales of borax and boron chemicals around \$5,500,000.

Shell Chemical are adding \$50,000 worth of portable bottle loading facilities, according to Frank Kuenzly, manager. **Ehrhart & Associates** are in charge of designing.

COLORADO

United States Sulphur Co. which controls one of the largest known sulphur deposits has been sold to the **Texas-Adams Oil Co.,** Denver and New York. An engineer estimate of the ore body states it is the equivalent of 500,000 tons of pure sulphur—crushed and used as a soil additive without further treatment—and valued at \$6,000,000 when fully developed. William J. McCarthy is president of the T-A concern.

Alamosa Cooperative at a recent meeting set up a drive to finance an anhydrous ammonia plant.

Umbaugh Chemicals is planning a test suit to check the constitutionality of a law under which they propose the industrial development reported here in February. The law permits cities to issue anticipation warrants. **Cotarco Inc.** will process coal and sell sulphur. Umbaugh will take their gas.

United States Sulphur Co., Dunton, owner of one of the nation's largest surface sulfur deposits, was sold last month to **Texas-Adams Oil Co.** of Denver and New York. Ore mined by U. S. Sulphur in the Dolores county area runs about 30% sulfur with the remainder consisting of other plant nutrients and inert elements; it is crushed and sold without further treatment as a soil additive.

FLORIDA

Florida Favorite Fertilizer, Lakeland, lost a building valued at \$10,000 and contents valued at \$30,000 in a fire March 11. Seed which ignited spontaneously is blamed for the conflagration, which flared up again several times when the firemen thought they had it under control.

Diamond R has recently added more than 8500 square feet of storage and truck loading facilities at Winter Garden, to handle the increased demand brought on by increased citrus production in Central Florida.

IDAHO

Central Farmers Fertilizer plans construction of what should by 1958 be a \$5,000,000 phosphate mining and processing operation on a 275 acre site near Georgetown. Part of the plant should be in operation by the first of the year, according to **Taylor Darden,** manager. Preliminary engineering and plans are now being drafted by the **Blaw-Knox** chemical plants division. The site is said to be one of the best phosphate deposits in southeast Idaho.

ILLINOIS

Sangamon-Grace Ammonia, a division of W. E. Grace, is reported to be buying a string of 14 anhydrous ammonia distribution plants in central Illinois, exercising the options secured last December. The corporations involved are **Central Illinois Fertilizer, Central Illinois Plant**

Foods and Longview Ammonia, Inc. Headquarters have been established in Decatur, with **Earl C. Abbott** as general manager.

Equity at Effingham, is planning a \$16,000 fertilizer plant addition.

Mid-South Chemical is building a fertilizer storage terminal of 1100 ton capacity at Pekin, to serve some 50 outlets in central Illinois. Complete equipment for unloading barges and loading into tank cars and trucks will be included.

Buhner Fertilizer's 10,000 square foot fertilizer mixing plant and warehouse at Havana should be ready for business by the time this sees print. Provision has been made for later expansion, according to Buhner officials.

IOWA

Nutra-Flo Liquid Fertilizer, Sioux City, is staging an intensive sales school for the 11 managers of **Quaker Oats** elevators in their area. The plant is new, with a 250 daily ton capacity which will be distributed in tank trucks within a 100-mile radius of Sioux City, according to sales manager **Glenn Winter.**

G & O Fertilizer Co., Cherokee, will erect a \$50,000 plant this year. The firm is headed by **Albert R. Griffith** and **Gunnar Osterling.**

KANSAS

Kaw Fertilizer Service, Lawrence, originally reported here in January, held an open house March 26 at the new plant. Present capacity is 5 hourly tons of mixer fertilizer, with storage capacity of 98,000 gallons. **Dean McHard** is president; **Don Westeffer** is plant manager. Within the year they hope to be serving a 10-county area.

Deep Root Fertilizer Co., Olathe, held its formal opening in February. A program featuring prominent agronomists in the Kansas-Missouri area attracted a crowd of 235 to the ceremony. Rate at 30,000 annual tons, the plant will produce 100 to 180 tons per 10-hour shift initially.

W. H. Lehman, president, is in charge of the plant operation, and **Paul E. Snow,** vice president, heads up the sales organization; **James McCreary** is vice president and treasurer. New York Yankee outfielder **Hank Bauer,** a stockholder in the firm, was on hand for the opening.

OLD soils need NEW life!
 revitalize them with - **THE IRON CHELATE**
PERMA GREEN IRON 135
 for **BIGGER, BETTER**
 and **FASTER-GROWING**
CROPS



UNTREATED

ORANGES

Four ounces to
 one pound
 PERMA GREEN
 IRON 135
 per tree
 produces dark
 green leaves
 and more,
 larger and
 better colored
 oranges.



TREATED

When iron is lacking and plant leaves turn yellow, PERMA GREEN IRON 135 makes them dark green in two weeks' time.

PERMA GREEN IRON 135 is an organic chelate that moves upward with the sap to rejuvenate the entire plant.

PERMA GREEN IRON 135 now produces -

- healthier and more productive blueberry bushes
- larger and more beautiful roses
- deeper-green leaves on azaleas and rhododendrons
- more attractive ornamental trees and shrubs.
- more nutritious vegetables
- more and juicier oranges and grapefruit
- more and larger nuts

Write for detailed information on PERMA KLEER IRON 135 for plants and reprint of scientific article on its action.

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SUNFLOWERS

Grown in
 nutrient
 solution.
 Small yellow
 plant at left
 treated with
 iron sulphate.
 Large dark
 green plant
 at right
 treated with
 PERMA GREEN
 IRON 135.



GARDENIAS
 (Greenhouse)

Iron is very
 important
 for gardenias.
 Treat each bush
 with 1/16 to 1/8
 level tablespoonful
 PERMA GREEN
 IRON 135
 to insure dark
 green leaves
 and large pure
 white flowers.



built by Blaw-Knox



A view of the TVA granular-process fertilizer plant built by Blaw-Knox Company, Chemical Plants Division, for the Illinois Farm Supply Company.

Illinois Farm Supply fertilizer plant helps meet demands of growing industry

Illinois Farm Supply Company's Tuscola, Illinois, fertilizer plant, using the TVA granular-process, was designed, engineered and constructed by Blaw-Knox. This modern, up-to-date and highly efficient plant is fully equipped with every facility for processing, storage, bagging, and shipping, having been designed for fast and economical production of top quality granular fertilizer.

Blaw-Knox has long been active in the fertilizer industry, designing and erecting facilities of various capacities, producing many types of fertilizer products. Our engineers have the experience and the technical "know-how" to help you plan and construct your fertilizer plant. We shall be glad to discuss all details of your project, including the process in which you are interested, plant layout, the equipment required, and other facilities needed for maximum efficiency and economy of operation and maintenance. Why not write us today?

Blaw-Knox Engineers are specialists in the design and construction of process plants of every description. We can furnish a complete fertilizer plant of any desired capacity or convert existing units into more modern and profitable operations. We welcome the opportunity to submit our recommendations.



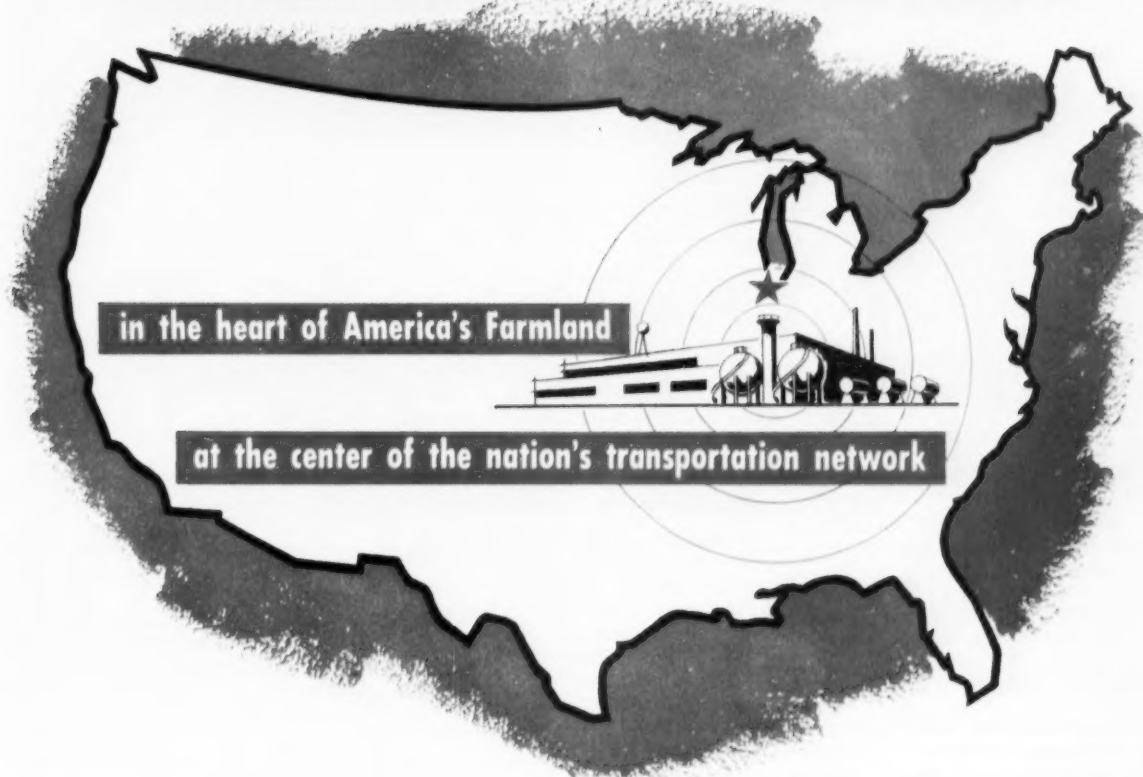
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Chemical Plants Division

Pittsburgh 22, Pennsylvania/Chicago 1, Illinois

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Strategically located in Hammond, Indiana, this ultra-modern plant will soon be on stream — producing high purity anhydrous ammonia and nitrogen fertilizer solutions for agriculture and industry.

The central location of this plant is of prime importance to you. It means *fast, low cost delivery* of your nitrogen needs via Sinclair's fleet of tank cars and tank trucks. Moreover, vast storage facilities will enable Sinclair to supply you with top quality products during your busiest periods.

For further information about how this new plant can meet your nitrogen supply problems, phone or write

SINCLAIR CHEMICALS, INC.

(Affiliate of Sinclair Refining Company)

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155 North Wacker Drive, Chicago 6, Illinois Phone Financial 6-5900



Design of the new headquarters laboratory of the Davison Chemical Company, Division of W. R. Grace & Co., ground for which was broken in mid-March, with completion scheduled for late 1956. The building will house 160, and be 52,000 square feet in total area. The laboratory is equally distant from Baltimore and Washington.

LOUISIANA

Petroleum Chemicals jointly owned by **Continental Oil and Cities Service** have definitely announced a \$12,500,000 petrochemical plant at Lake Charles, to produce 100,000 annual tons of anhydrous ammonia. This will be marketed by Mid-South, also jointly owned by the two oil companies. Completion is scheduled for Fall, 1957.

Marietta Concrete has completed construction of four more of its precast concrete stave silos at Lake Charles. These silos, 30 feet in diameter and 70 feet high are in addition to eight other identical silos erected last year by Marietta Concrete for the Harbor and Terminal Commission.

MAINE

Northern Chemical Industries, affiliate of Summers Fertilizer, Baltimore, has dedicated its \$650,000 sulphuric acid plant which can produce 100 daily tons and was in addition to the 70 daily ton plant built in 1943. Their ammonia plant, costing \$9,000,000 and slated to turn out 125 daily tons, and their 60 daily ton nitric acid facility are to be finished by June 1.

MARYLAND

Miller Chemical and Fertilizer, Salisbury, in February set 3 bottles of green liquid on the table in front of City Council, and according to reports "not a nostril twitched." Nevertheless in mid-March, the same Council by a 3-0 vote told Miller they could not produce liquid fertilizer in their plant. In between these dates there was much marching up and down by neighbor delegations and discussion by the Council. The neighbors were sure they had lost, and were startled when they won. Miller has been and is

making pesticides, and their plant is in an industrial zone.

MINNESOTA

St. Paul Ammonia Products' \$16,000,000 plant at Pine Bend will be under way when you read this, if weather permits. Ground was broken last September and some of the site cleared. President **Dan A. Williams** believes the plant will be at least partially in operation by the end of this year.

MISSISSIPPI

Mississippi Chemical of Yazoo will sponsor a \$5,000,000 high analysis fertilizer plant is the first project in the new Pascagoula Harbor development. Construction is subject to sale of \$4,000,000 of securities to the farmers who will use the fertilizer, according to **C. W. Whittington**, MCC president. The plant is to produce 150,000 annual tons.

NEBRASKA

Stauffer Chemical has begun production in its new \$500,000 plant in Omaha's Gibson Industrial District, making a full line of crop chemicals, which in time will grow to 168 different agricultural items which will be distributed from that plant to a 14-state area.

A. C. Fertilizer Co., Henderson, has been incorporated with an authorized capitalization of \$25,000, by **Eugene V. Siebert**, **Melvin H. Koreker** and **Ralph H. Koreker**.

Aurora Cooperative Elevator has paid a patronage refund of \$30 on each ton of anhydrous ammonia bought in 1955.

Nebraska Consumers Cooperative has found it pays to hold fertilizer education programs. Through their efforts farmers who had not used

much, if any fertilizer, have grown through education—to appreciate it, and their consumption has risen sharply.

Cooperative Oil Company, Wallace, will enter the anhydrous ammonia field. **Ed Swanke**, manager of the soil station will manage the new fertilizer department.

NEW YORK

Commercial Solvents is stepping up its outdoor poster program for its 2-Step Action ammonium nitrate fertilizer throughout the pre-planting season. Radio and farm papers round out the campaign, prepared by **Fuller, Smith & Ross** advertising agency.

Borden has announced a slow release nitrogen fertilizer, to professional horticulturalists only. A single application is intended to meet all nitrogen requirements for a full growing season. The product, result of 15 years research, is a 38-0-0 derived from urea and is supplied in white granules with irregular edges that tend to prevent leaching.

OHIO

Diamond Alkali, Cleveland, are completing plans for expansion, which will include expansion of crop chemicals production at Newark, N. J.; Des Moines, Iowa and Houston, Texas. At Deer Park, a multimillion program, on which construction will soon start, will expand perchlorethylene production, and provide for future expansion in chlorinated products, according to **Loren P. Scoville** general manager of the chlorinated products division.

OKLAHOMA

Phillips Petroleum is issuing a series of booklets on pasture and range plants, beautifully illustrated with water-color drawings of the various subjects. This series is related to the demonstration project they are conducting near Foraker, where range management, fertilizers and other petrochemicals for agriculture are being studied. The site of this operation is the K. S. Adams ranch. Mr. Adams is chairman of their board. The booklets are being distributed from Phillips division offices, and free copies can be had by writing the nearest sales office or to the company direct, 466 Adams Building, Bartlesville, Okla.

Ozark Mahoning has opened its new fertilizer distributing center at



CHEMICO SERVICES TO THE FERTILIZER INDUSTRY

Chemico offers a complete engineering and contracting service to the fertilizer industry... ranging from the design and construction of complete fertilizer works to furnishing small individual units and auxiliary plants of specialized nature.

COMPLETE FERTILIZER WORKS
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SUPERPHOSPHATE AND DOUBLE
SUPERPHOSPHATE PLANTS
•
PEASE-ANTHONY SCRUBBERS FOR DUST
AND FUME ELIMINATION
•
CONTACT SULFURIC ACID PLANTS
•
SYNTHETIC AMMONIA PLANTS
•
UREA PLANTS
•
AMMONIA OXIDATION UNITS
FOR CHAMBER ACID PLANTS
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AMMONIA STORAGE AND MIXING UNITS
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AMMONIUM SULFATE
AND AMMONIUM NITRATE PLANTS
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EXTENSIONS AND MODERNIZATION
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Chemico recommendations, designs and installations are backed by 40 years of specialized experience in building heavy chemical plants. More than 900 successful installations are your assurance of complete satisfaction.

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Dry as the Desert !

FOR FERTILIZER, Koppers offers a good commercial grade of ammonium sulphate. It comes in crystals that are low in moisture and free-acid content.

Fine for Fertilizer

There's another reason why Koppers Ammonium Sulphate is fine for fertilizer. It is high in nitrogen content; in fact, the nitrogen content is guaranteed to be not less than 20.5%.

Shipment

From St. Paul, Minn. and Kearny, N. J., Koppers Ammonium Sulphate is shipped in 100 lb. and 200 lb. bags—also in box cars and trucks. From Granite City, Ill. and Midland, Pa., it is shipped only in box cars and trucks.

Dependable Source

Koppers is a dependable source of supply for ammonium sulphate. Get in touch with us concerning your requirements. Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pennsylvania.



KOPPERS COAL CHEMICALS

**THE REPORTS PROVE ALL
MULTIWALL BAGS ARE NOT ALIKE !**



"These field trips are good for a Sales Manager. They certainly keep a fellow up to date on new developments.

This trip, it's the reports I'm getting on the ALL-TEMP Multiwalls we bought—especially from those customers who stored our product in unheated warehouses. There was less damage from moisture penetration and the bags didn't become stiff and hard to handle.

At the next general meeting I'm recommending to purchasing that we continue to get bags with ALL-TEMP LAMINANT.

Our customers like them...and that's what really counts."

**ALL-TEMP LAMINANT IS A DEVELOPMENT OF
THE ARKELL SAFETY BAG COMPANY FOR USE IN
"ARKSAFE" MULTIWALL BAGS—AT NO EXTRA COST!**

ARKELL SAFETY BAG COMPANY

(Est. 1896)

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OUR IMPROVED

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- HIGH ANALYSIS
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Faith in the Future

Talk about confidence in the future! On one sheet of manuscript paper that lies before me, destined for Around the Map, and to occupy only a few inches in that department of this issue, we have recorded \$120,000,000 of new construction. Pennsalt will spend \$55,000,000 of which \$40,000,000 is to come out of earnings; Dow Chemical will spend \$45,000,000; Delhi-Taylor is reported to be planning a \$20,000,000 unit.

That is confidence in the United States of America, not in any one man or any one political party—because politics this year is almost literally in the lap of the gods. It expresses a faith that the upward sweep of this nation will continue. It reduces to mere mouthings the political oratory now being heard in farming areas. It should be a pretty sturdy straw to show the USSR which way the wind is blowing in our country.

Our "Map" department, as we call it, is always an indicator of the confidence of large and small concerns. Whether it be a 25,000 ton mixing plant, or a multimillion dollar petrochemicals operation — the project demands the outlay of hard cash by people who think more than twice before spending it. —Editor.

Here's a good chemical for 3 jobs

Sprays
Dusts
Fertilizers

Triangle Brand Copper Sulphate

Triangle Brand Copper Sulphate has been recognized as an effective agricultural chemical for more than sixty years. In sprays (where Bordeaux mixtures are the most reliable), in dusts (if you prefer them) and in fertilizers (for additional enrichment of the soil) Triangle Brand Copper Sulphate has proved itself worthy and dependable. Try these Triangle Brand forms of Copper Sulphates:

INSTANT (powder) for quick and efficient mixing or Bordeaux sprays.

SUPERFINE (snow), **SMALL** or **LARGE CRYSTALS**, all containing 25.2% metallic copper.

BASIC Copper Sulphate in powder form, containing 53% metallic copper.

Write for booklets that will help you solve your agricultural problems.

Control **POND SCUM** and **ALGAE** with Triangle Brand Copper Sulphate. Write today for information on how it can help you maintain healthy water conditions.

PHELPS DODGE REFINING CORP.

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Claremore, with Olen Downing in charge. Fertilizer materials will be distributed to an eleven state area, according to Chas. T. Longaker, director of fertilizer sales.

PENNSYLVANIA

Pennsalt are taking the first steps toward a program which contemplates the expenditure of \$55,000,000 in the next few years. It will introduce products and process new to the company, the installation of more efficient facilities and the improvement of existing processes. Construction already under way runs into the multi-millions—at Calverty City, Ky., Wyandotte, Mich.; Portland, Ore.; Tacoma, Wash. Except for \$15,000,000 from debentures to be sold the public, the entire program, it is contemplated, will be financed from present funds and operating income.

TEXAS

Dow Chemical will spend \$45,000,000 expanding its Texas facilities at Freeport in the next 18 months, including a new plant for soil fumigants.

Texas Farm Products' new high analysis pelletized fertilizer plant at Nacogdoches has begun test-run operation. It is rated as one of the most modern of its kind. It is the third major expansion in the last three years for the makers of Lone Star.

UTAH

Delhi-Taylor Oil is engineering a potash shaft at Moab, which should logically lead to an extraction unit. It is generally believed, but definitely not confirmed by the concern, that a \$20,000,000 unit may be in the offing there.

VIRGINIA

Smith-Douglass got moved into its modern new quarters in January. The handsome structure, located on Virginia Beach Boulevard near the outskirts of Norfolk, brings together all elements of the firm's general offices and those of its subsidiaries.

WASHINGTON

Cominco Products, Consolidated Mining and Smelting sales organization, is building a \$1,000,000 storage plant at Trentwood, which will handle 50,000 tons of bagged goods. A tank farm is also planned.

Green Soil Conditioner and Fertilizer are planning a \$45,000 processing plant near Loon Lake.



"The bag lasts longer than the fertilizer"

says Sydnor Y. Priddy, president of Charles W. Priddy & Co., fertilizer manufacturers of Norfolk, Virginia. "Farmers want their fertilizer in burlap so they can use the bags to pack their own produce after they've used the fertilizer. Burlap bags have more uses around a farm than you can name. "We know that burlap is safer for shipping fertilizer than any other kind of bag. No matter how they go—by train or truck, they won't chafe, break or tear."

Pack your fertilizer in burlap bags for easier handling in the plant and better protection during shipping. Use "bag appeal" to sell more fertilizer to farmers in your area.

**Just ask your own customers —
they'll tell you that burlap**



Is strong — takes dragging, dropping, man-handling — any tough job on the farm.



Gives good ventilation — keeps farm supplies and products fresh.



Laughs at sudden showers — wetness or dampness can't weaken it.



Saves money — extra value from re-sale and re-use.



Saves storage space — stacks to any height without slipping.



Has 1000 uses — always in demand on the farm (popular with farm wives, too!)

THE BURLAP COUNCIL

of the Indian Jute Mills Association

155 East 44th Street, New York 17, N. Y.

AFRICA

Societe Miniere du Benin, which holds the concession for Togo phosphate deposits are starting a pilot operation, to process 5,000 tons of phosphate. A full scale exploitation will follow if the test is an economic success.

* * *

Sasolburg will be the site of a plant to process phosphates from **Foskor** and ammonium sulphate from **Sasol**, which should be ready in two years, and capable of producing 150,000 annual tons of superphosphates and almost twice that much of mixed fertilizers. They will also produce sulphuric acid. Cost, about \$9,000,000.

* * *

Salisbury, in Southern Rhodesia, will be the site of an \$8,000,000 plant addition, with completion expected by 1958. The new facility will include sulfuric acid and phosphoric acid units along with new superphosphate capacity. Consideration is also being given to production of nitrogenous fertilizers in Southern Rhodesia, but definite plans will probably not mature until the Kariba Gorge hydroelectric project is completed.

AUSTRIA

Production at **Austrian Nitrogen Works** is expected to exceed 600,000 tons of nitrogenous fertilizers this year, 30,000 tons up from the 1955 mark. During the past three years, output has increased by 57%. While domestic sales remain relatively constant, exports are expected to absorb the additional tonnage. The plant's sulfuric acid production, in full swing for more than a year now, holds steady at an annual rate of 37,500 tons.

CANADA

North American Cyanamid is doubling the nitrogen solutions capacity of its Welland plant, and the anhydrous ammonia equipment will be modified for greater capacity, according to plant manager **G. L. Berry**.

EGYPT

Egyptian Chemical Industries has awarded contracts for the building of a \$63,000,000 plant near Aswan Dam, to produce 1280 daily tons of nitric fertilizers, to start production in 1959. A Franco-German combine submitted the low bid.

Ahmed-Abboud Enterprises have secured a \$6,000,000 loan to expand their Suez plant from 220,000 annual tons to 320,000.

GERMANY

Beginning this month the West German government will subsidize fertilizer sales to the extent of more than a billion marks, in order to bring farm income into line with industrial wages.

INDIA

Montecatini has been awarded the turn key contract for the **Sindri** expansion.

ISRAEL

Dead Sea Potash, in which the government has a controlling interest, may need doctoring and it is reported that consultants may be called in to find out why almost twice as much money as was estimated has been required to get it up to full production of 150,000 annual tons.

MEXICO

California Liquid Fertilizer Co. is planning a branch plant and central distribution warehouse at Torreon (Coahuila State), one of the major agricultural areas in Mexico. The projected investment is expected to run into millions of pesos, and will help ease a shortage of plant foods that persists despite increased production and larger imports.

NETHERLANDS

Eerste Nederlandse Cooperatieve Kunstmestfabriek are adding two plants. One to produce ammonium phosphate, the other to process sulphur into concentrated sulphuric. Both should be in product by the end of this year.

VENEZUELA

The government's **Ministry of Mines and Hydrocarbons**, organized two years ago to develop a petrochemical industry, reports it has a fertilizer mixing plant now in operation at Moron, Carabobo, using imported prime materials. Seeking to gain experience in fertilizer use and to develop markets and distribution systems, the ministry hopes to boost annual consumption from the current 10,000 tons to 100,000 tons by the end of 1957, at which time their petrochemical plant will be in operation and capable of furnishing materials for a 100,000 ton fertilizer industry.

A&S Patents Bag Opener

Arkell & Smiths has applied for patents on a simple and efficient multiwall bag-opening device called the "Zip-Top".

When adapted to the standard A & S sewn valve or sewn open-mouth bag, the "Zip-Top" permits easy opening with one sharp pull of the tab. The opening thus formed extends to full length of the bag.

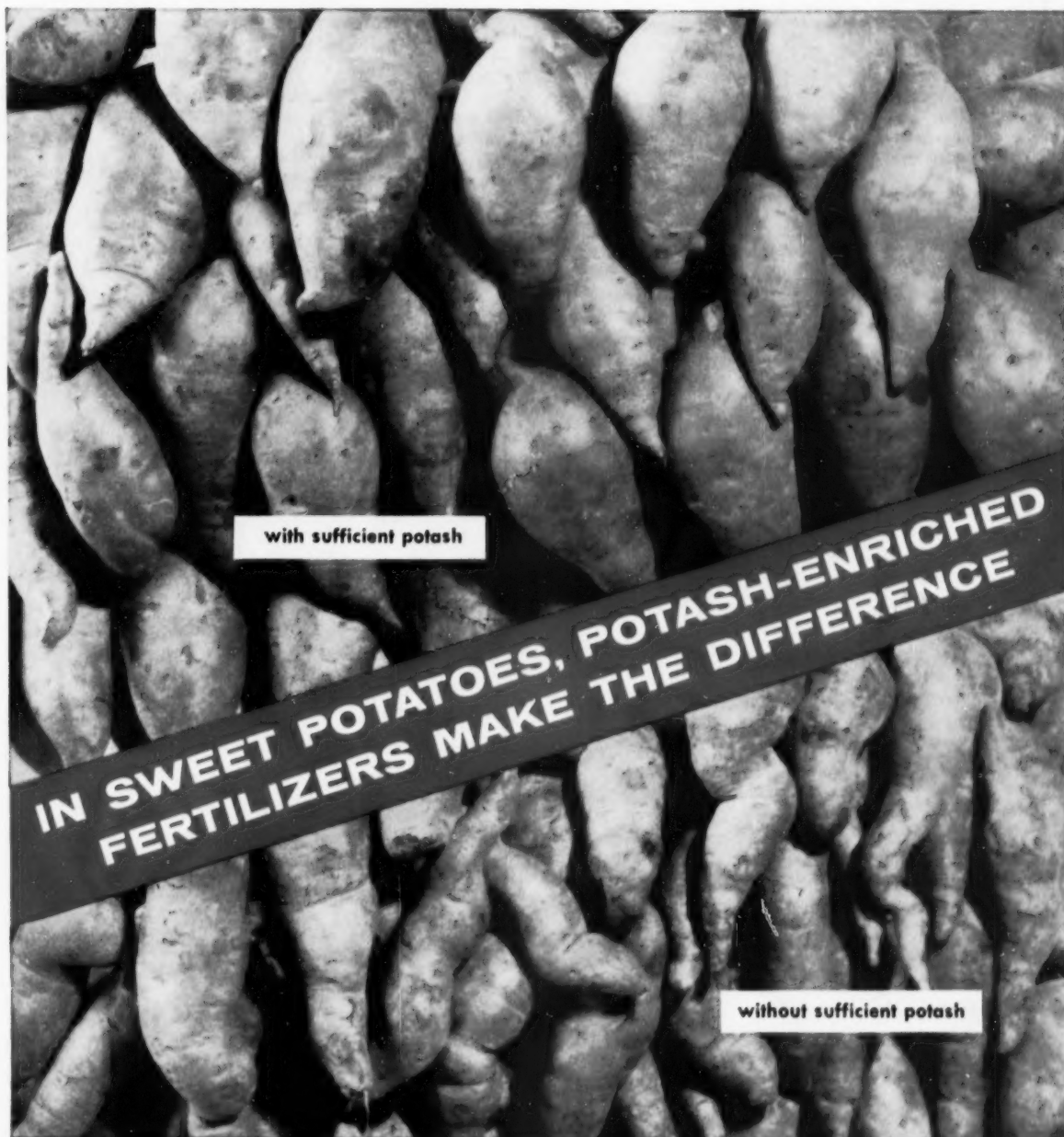
Andrews Machine Co. Offers New Mixer

A dry fertilizer batch mixer, that is quickly and easily set up as a complete fertilizer plant to deliver seven tons of pulverized and completely mixed fertilizer per hour, is the latest achievement of the **Andrews Machine Company**, Decatur, Ill. Delivered in one compact unit, all that's needed to get into the dry fertilizer business with this machine is to set it in place and wire to the motors, with no other installation work required, according to the manufacturer.

The machine is built of heavy gauge steel and all welded construction for sturdy, long lasting service. Two 7-1/2 H.P. motors drive the vertical screw and mixer, engineered for continuous work load using all heavy duty bearings and large diameter shafts. Powerful hammers in the bottom of the hopper break up any lumps. In addition to dry fertilizer, the Andrews mixer can be used to mix any other types of dry material.

In a simple, efficient operation sequence, the ingredients are first weighed and then dumped into the hopper. The vertical screw elevates the material and discharges it into the mixer. After the batch is mixed, the same vertical screw elevates the finished goods to the spout for discharge into truck, bag, or bin. A two-way control on the spout allows the material to be discharged either into the mixer, or into the truck or other receptacle.





with sufficient potash

**IN SWEET POTATOES, POTASH-ENRICHED
FERTILIZERS MAKE THE DIFFERENCE**

without sufficient potash

Using balanced fertilizers farmers are able to improve nutrition-poor soils and produce healthy, vigorous, and profitable crops. Potash is an essential partner in a balanced fertilizer, building crop resistance to disease, improving the quality of the crop, and increasing yield.

U.S.P.'s high-grade muriate of potash has the highest K_2O content and is free-flowing and non-caking—important advantages in the man-

ufacture of these modern fertilizers which help American farmers to better crops and better incomes.



REG. U.S. PAT. OFF.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

**UNITED STATES
POTASH COMPANY**
INCORPORATED

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Rhodes-Haverty Building,
Atlanta, Georgia



T. L. Brook has been elected president of **Northwest Nitro-Chemicals**, Medicine Hat, Alta. Canada, affiliated with **Commercial Solvents**, whose president, **J. Albert Woods** announced the election of Mr. Brook and the appointment of **Clarence W. Hancock** as Northwest's general manager.

* * *

Miller Chemical & Fertilizer Corporation, Baltimore, Maryland, manufacturers of agricultural chemicals, at a recent directors' meeting elected **L. W. Cameron** president of the company. Mr. Cameron, who has been with the Company since 1940,

Robert R. Heck has joined **Southern Nitrogen Company, Inc.**, Savannah, Ga., as Technical Service Representative. Up until the present, Mr. Heck was employed by **Allied Chemical and Dye Corp.** Two and a half years were spent in the **Pilot Plant Research Laboratory** at Hopewell, Va., doing research work on fertilizer manufacturing. In the past year Mr. Heck was technical salesman for the fertilizer manufacturing division, assisting manufacturers in the use of nitrogen products in pulverized and granular fertilizers.



Alexander "Pete" McBride who has joined **U. S. Potash** as a sales representative. It is expected he will share with **Woody Wilson** the midwestern territory recently vacated by **John Fletcher**.



The potash division of **International Minerals & Chemical Corporation** has appointed **Roy Roughton** sales representative for agricultural potash salts in the Chicago district. **Nelson White**, vice president in charge of the division, announced.



has served in the capacity of Treasurer. **Roger W. Cohill**, former sales manager of the insecticide division, has been named vice president and general sales manager; and **W. D. Ashmore** has been named treasurer.

Other changes included the appointment of **C. E. Carr** as assistant treasurer, **Howard F. Long** as assistant secretary, **W. D. Wilner** and **Frank R. McFarland** as assistant sales managers.

W. Newton Long, former president, and **Thos. L. Smith**, former vice president and general sales manager, have reached retirement age with the company but will remain active on a part-time basis as chairman of the board of directors and as sales manager of the fertilizer division, respectively.

* * *

Robert U. Haslanger has been elected vice president and general manager of **Escambia Bay Chemical Corporation**, it was announced by **Kenneth G. Donald**, president. Recently Mr. Haslanger was with **Stauffer Chemical Company** as assistant to the president and director of sales, industrial chemicals. Here he was an active member of the management committee, research advisory committee, and development advisory committee.

* * *

Four appointments to the recently created general office, bag division of **Fulton Bag & Cotton Mills**, New Orleans, have been announced by **Jason M. Elsas**, vice president and division general manager. They include **W. W. Plumb**, Atlanta, Ga. as director of manufacturing; **J. A. Banda**, Atlanta, Ga. as director of export sales; **F. C. Sivor**, New Orleans, La. as director of canvas sales

Union Bag & Paper Corporation has announced the appointment of **J. J. Patterson Jr.**, left, as director of multiwall bag sales and **William T. Bess Jr.** as assistant director of multiwall bag sales.



Personals . . .

and **H. H. Rogers**, Atlanta, Ga. who will be in charge of industrial engineering.

* * *

Eugene H. Holeman, president, Association of Food and Drug Officials of the United States and superintendent, Division of Foods and Drugs, Tennessee Department of Agriculture, has appointed **Louis H. Wilson**, secretary and director of information of the **National Plant Food Institute**, as director of agricultural relations of the 50th Anniversary Committee in connection with the celebration (1906-1956) of the **50th Anniversary of the Federal Food, Drug and Cosmetic Laws**.

The **National Grange** has declared its wholehearted support of a Congressional move designed to officially commemorate the 50th anniversary in 1956 of the **Pure Food & Drug Act**.

* * *

Leo R. Gardner, manager of research and development for the **California Spray-Chemical Corporation**, recently announced the appointment of **Dr. George W. Schmitz** as research agronomist for the company. Dr. Schmitz was formerly Assistant Professor in the Soils Department of Oregon State and was located at the **Klamath Experiment Station**, Oregon.

* * *

Dr. Hal B. H. Cooper has joined **American Potash & Chemical Corporation** in the newly-created position of director of development engineering, according to an announcement by **Dan S. Dinsmoor**, vice president in charge of research and development.

Cooper will be in charge of special engineering phases of new projects

FORMULATORS—DISTRIBUTORS—REPACKAGERS

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(30% as Metallic)

Compare These Advantages and Incentives:

- ✓ Inexpensive
- ✓ Profitable
- ✓ Iron content 30% as metallic
- ✓ Effective correction of iron chlorosis at low dosage rates
- ✓ Easily applied as spray or dust to foliage
- ✓ Compatible in mixtures or combination applications with common spray dust chemicals
- ✓ Completely safe to foliage
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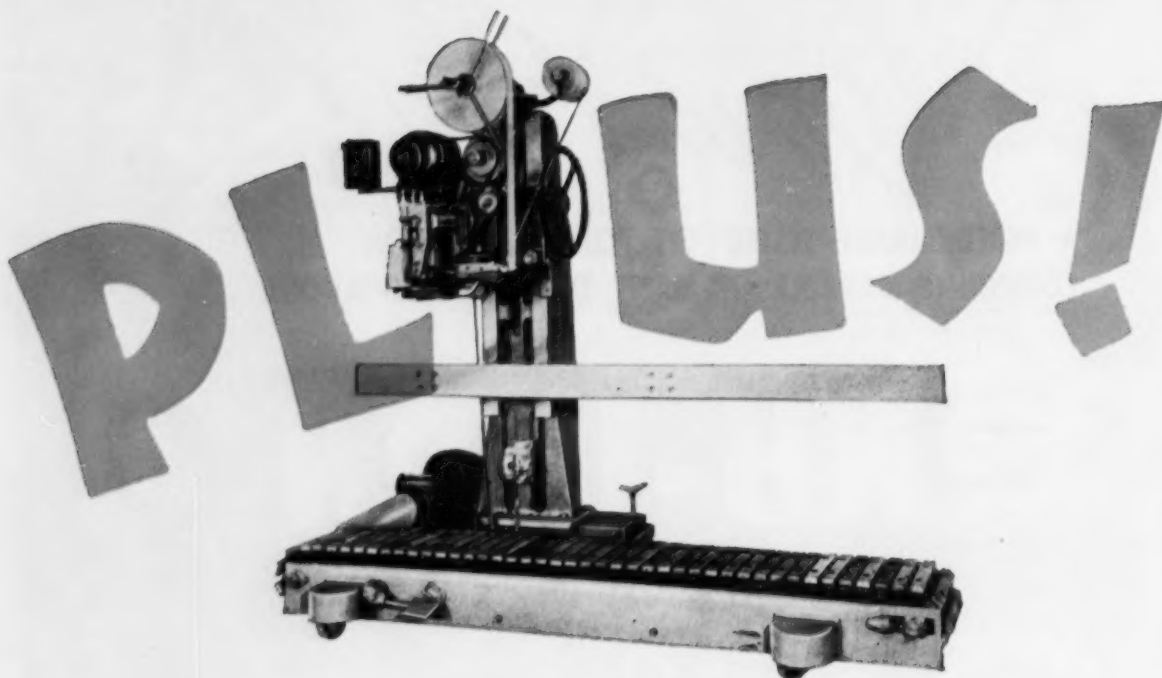
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CORPORATION

617-629 Grant Building, Atlanta, Georgia

The Bag Closing Machine With a Real



There's an extra **PLUS** built into every model ET BAGPAKER delivered... the **PLUS** of assured day-in, day-out top performance.

The Model ET ties in with your existing filling and weighing equipment...closes open-mouth, multiwall paper bags semi-automatically... gives you sift-free, stronger, more economical bag closures with the famous BAGPAK cushion stitch.

You can count on the model ET BAGPAKER to give you faster packaging and better product protection...at lower cost.



Model ET applies famous "Cushion-Stitch" over dry tape for sift-proof closure. Model E-1 applies "Cushion-Stitch" only, for use where sift-proofing is not essential.

Check these Economy and Efficiency Features:

- + Closes 15 filled bags a minute.
- + Fast adjustment to bags from 25 to 100 lbs.
- + Completely portable—rolls to any packaging station.
- + Bag starts and stops serving head when equipped with automatic control.
- + Hoepner No. 150 Heavy Duty Sewing Head with automatic brake to prevent "coasting".

Bagpackers available include models A, D-A, ET, E-I and F-I—with capacities from 60 tons per hour for the Model "A" to the small F-I where large volume is not required.

Write today for details, drawings and capacities to Bagpak Division, International Paper Co., 220 E. 42nd St., N.Y. 17, N.Y., Dept. CF-4

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BAGPAK DIVISION

220 East 42nd Street, New York 17, N. Y.



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and developments at various company plants and will act as engineering advisor on pilot plant research operations.

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CHANGES

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Announcement of the plans was made by William M. Clines, western sales manager, who said that opening of regional offices was a part of the company's current development and expansion program.

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The new corporation combines the manufacturing facilities of The Raymond Bag Company of Middletown, Ohio, with those of the Multiwall Bag Division of Albemarle, located at Richmond, Virginia. Paper for both operations will be supplied by Albemarle's two Richmond paper mills and their Halifax Paper Division at Roanoke Rapids, North Carolina, making the new corporation a fully integrated operation with General Offices at Middletown, Ohio.

Officers of the Raymond Bag Corporation include F. D. Gottwald, chairman of the board; C. L. Mers, president; J. H. Lawrence, vice president—manufacturing; J. R. Clements, vice-president—sales; W. G. Shaw, treasurer; and C. C. Mers, secretary.

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the sterilized organic conditioner

For years ... First Choice of Leading Fertilizer Manufacturers

Fur-Ag is an inexpensive organic conditioner that is produced in volume and shipped to you on schedule the year around. Fur-Ag reduces bag set, promotes drillability, speeds up curing in the pile and provides bulk. It is sterilized—free from plant diseases, insects, weed seeds—and being dark in color makes a rich-looking piece of goods. Write today for complete information—Bulletin 127.

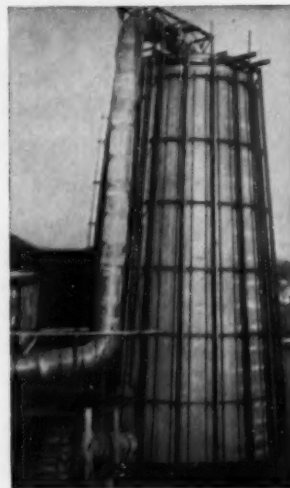


The Quaker Oats Company
CHEMICALS DEPARTMENT

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Construction
of
Complete
Acid
Plants



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1610 Kentucky St.
New Orleans, La.
Phone Bywater 8373



REPRESENTATIVE ANALYSIS

Calcium content —CaCO ₃ value	52.47%
Magnesium content —CaCO ₃ value	44.23%
Calcium Carbonate —Equivalence	96.70%

MAGNESIUM LIMESTONE

EACH TON OF MASCOT LIMESTONE
CONTAINS ABOUT

3.6 Lbs. Zinc	.75 Lbs. Manganese
4.8 Lbs. Sulphur	.05 Lbs. Copper

American Limestone Co.

Box 2389

Knoxville, Tenn.



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Low Costs with **FUR-AG®**



the sterilized organic conditioner

For years ... First Choice of Leading Fertilizer Manufacturers

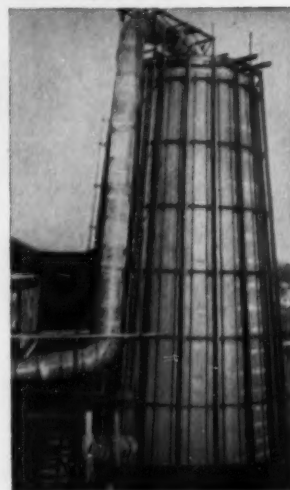
Fur-Ag is an inexpensive organic conditioner that is produced in volume and shipped to you *on schedule* the year around. Fur-Ag reduces bag set, promotes drillability, speeds up curing in the pile and provides bulk. It is sterilized—free from plant diseases, insects, weed seeds—and being dark in color makes a rich-looking piece of goods. Write today for complete information—Bulletin 127.



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Fertilizer Equipment Sales Corp.

Designers — Engineers — Manufacturers of Fertilizer Machinery

Sales and engineering office:
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Atlanta, Ga.
Phone Cypress 6615

Manufacturing plant:
P. O. Box 67
1610 Kentucky St.
New Orleans, La.
Phone Bywater 8373



REPRESENTATIVE ANALYSIS

Calcium content —CaCO ₃ value	52.47%
Magnesium content —CaCO ₃ value	44.23%
Calcium Carbonate —Equivalence	96.70%

MAGNESIUM LIMESTONE

EACH TON OF MASCOT LIMESTONE
CONTAINS ABOUT

3.6 Lbs. Zinc	.75 Lbs. Manganese
4.8 Lbs. Sulphur	.05 Lbs. Copper

American Limestone Co.

Box 2389

Knoxville, Tenn.

R. A. Young & Son, Inc., 301 South Tenth Street, Fort Smith, Ark., has been appointed to sell and service the Michigan line of tractor shovels and excavator cranes, products of the construction machinery division of **Clark Equipment Company**, according to an announcement by **Clarence E. Killebrew**, Clark vice president. The dealer will handle Michigan products in the entire state of Arkansas, with the exception of the following counties: Clay, Green, Craighead, Mississippi, Poinsett, Cross, Crittenden, St. Francis, Lee, Phillips, Chicot, Ashley, Union, Columbia, Lafayette and Miller. The company has a branch office at Fifth and Rector Streets, Little Rock, Ark.

Blaw-Knox Company's chemical plants division has expanded its mid-West headquarters at 180 North Wabash Ave., Chicago, Ill.

Stephens-Adamson Mfg. Co.'s standard products division has opened a warehouse at 650 Murphy Ave. S. W., Atlanta, Ga. Bldg. E. Unit 18. They will hold open house April 6-7.

The executive offices of **Link-Belt** have moved to the new Prudential Building, Chicago. The address: Prudential Plaza, Chicago 1, Ill. The phone: RAndolph 6-7790, same as it has been.

Union Bag Ads Feature Testimonials

A new testimonial advertising campaign, featuring both fertilizer manufacturers and farmers, has been announced by the multiwall bag sales division of **Union Bag & Paper Corporation**. This series of advertisements will appear in leading fertilizer magazines during 1956.

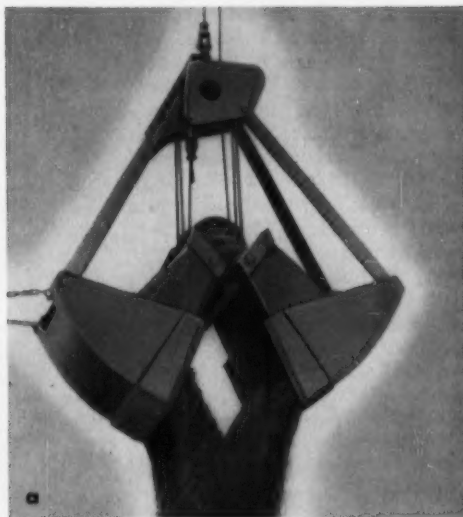
Each of these advertisements features two testimonials . . . one from a fertilizer manufacturer, the other from his farmer customer. Both men comment on the effectiveness of Union's continuing educational program in behalf of the fertilizer industry.

To get his story to the farmer, the program uses the mediums of newspapers, radio and television. All program information is planned to create a widespread awareness of the benefits to be derived from the proper utilization of fertilizer.

ideas

for low-cost
bulk-material

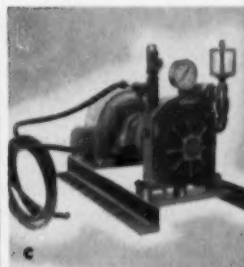
- STORAGE
- CHARGING
- BATCHING
- BLENDING



Fertilizer Buckets — To stockpile, load and unload bulk chemicals, fertilizers, and other fine-grained materials, Johnson brings you a special wide-rehandling clamshell bucket. All-welded, fast-filling, clean dumping. Tight closing lips prevent load leakage. Sizes — $\frac{1}{8}$ to 3 cu. yds.



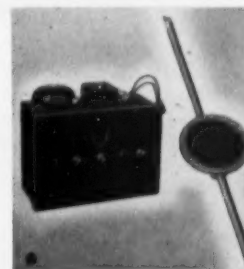
Pivoted Distributor
directs flow of materials into multiple-compartment bins. Turns and locks into position, controlled from ground level.



Rotary Vane Compressor
supplies 7 cu. ft. of air pressure per min. to aerate silos and bins. Limit-relief valve keeps pressure within 15 lbs.



Aeration Fittings
for storage silos, bins, keep bulk materials free-flowing. Moisture trap and pressure-reducing valve are included.



Bin Gauge Signals
accurately indicate high-low level of storage bins, silos. Automatic signal box can be located wherever convenient.



Rotary Plug Valve
controls flow of finest materials from silo to screw conveyor. It's also efficient as fill valve on batchers.



Elevator Buckets
are all-welded, smooth, fast-filling, quick-dumping. Two types, 8 sizes. Steel chain has all carburized knuckles.

mail to: **C. S. JOHNSON CO.** CHAMPAIGN, ILL. (Kochring Subsidiary)

Send complete details on items checked: a b c d e f g

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Also: BINS • BATCHERS • ELEVATORS • SILOS • FERTILIZER PLANTS

Economic research, intensified to provide an objective basis for judging the effectiveness of future farm program proposals, to guide long-term adjustments in agricultural production and to help farmers make proper decisions in organizing and operating their farms was urged by the USDA's Production Economics Research Advisory Committee at its most recent meeting. They set up 7 categories: Adjustments in farming; Production, income and costs; Farming efficiency; Farm finance; Resource use and development; Land values and tenure; Forestry and timber production. If you want to know more, write Dr. Carlton P. Barnes, USDA Agricultural Research Service who is executive secretary of the committee.

Application research in the field of farm machinery for applying pesticides, weed-control chemicals and fertilizers was put high on the agenda of the most recent meeting of USDA's Farm and Home Equipment and Structures Advisory Committee. Dr. Barnes is executive secretary of that committee, too.

Subsoil can be made to flourish when fertilizer and plenty of water are teamed up. Great Western Sugar Company's Colorado Experiment Station skinned an area down to the subsoil and tested a variety of plant food combinations on it. The first year they made a good crop of sugar beets, and the next year a good wheat crop. Most significant to the researchers, who included Dr. Harvey Brewbaker, was the fact that inorganic fertilizers could grow crops and develop organic matter at the same time, and that nitrogen, working on crop residues, conditions the soil in much the same way as legumes do.

Quick recovery of soil was demonstrated by the University of Illinois farm plot which was put in corn continuously for 79 years without any treatment. It got down to 19 bushels per acre. Then \$60 worth of fertilizers per acre brought it right back up to 86 bushels. U of Ill.'s soils specialist, L. B. Miller, points out that the 60 dollars should not be charged entirely to the 86 acres because of the residue which will help next year. Conclusion: Continuous corn is not necessarily good farming, but if soil is a good type, rejuvenation can be achieved in a hurry. A rotation plot, sensibly fertilized through the years has averaged 113 bushels per acre for the last six years.

RESEARCH RESULTS & REPORTS

TVA pot tests, with rye grass as the test subject, are being used to supply the answer to crop yield response from the new TVA fertilizers. Soils ranging widely in pH are being used in the greenhouse, so climatic variations will not affect the data, which would be the case of the samples were tested in their native areas—Tennessee, Iowa and Nebraska.

Caustic soda by-product may be utilized via the new process developed by the National Chemical Laboratory at Poona, India. They add rock phosphate to commercial hydrochloric at 40-50° then add ammonium sulphate to the slurry. After grinding they have a free-flowing powder which is stable in weather changes, and shows 7.4% nitrogen and 15% phosphorus.

Fungus research is being speeded up by a process developed at Louisiana State by Dr. H. H. Luke together with Dr. H. E. Wheeler. Dr. Luke has carried the process with him to his move to the University of Florida. Instead of laboriously checking a whole field for plants resistant to fungi they germinate in flats and spray the seedlings with toxin. Survivors are given a really heavy dose. This way they found a plant which resists H-V fungus and crown rust as well—and seed is being grown from this plant. The final test is, of course, the resistance shown by the plants grown from this seed under normal conditions. That test has not yet been possible, and will not be until enough seed is ready to plant test plots.

Seed bathing expedites the germination of cotton seed, according to Dr. V. T. Walhood, University of California. Simple—the process consists of immersing the seed in water at 170 to 180° F. The result is immediate and permanent, and stored seed will retain the benefits. The quick germination helps defeat rot, 'skippy' stands and delayed crop maturity, getting the young plants up through the soil surface and off to a fast start.

Fir growth can be stimulated by fertilizer, increasing annual volume growth as much as 65% per year in a 30 year old Douglas Fir stand, according to reports from the University of Washington's College of Forestry. That 65% means an increase of 85 cubic feet per acre per year. Christmas tree growers, not surprisingly, are very much interested, as they are in the fact that Christmas tree color can be varied from pale yellow to dark green. Dr. S. P. Gessel and Dr. R. B. Walker have been conducting the experiments.

Spacing overemphasized is the conclusion of S. K. Ries, Michigan State, after 2 years of research with pickling cucumbers planted in a wide variety of spacings. Over the full season there was no difference in total yield and it seems that the importance of proper spacing has been over-emphasized.

New fungicide is reported by Robert Cohen and Robert O'Connor of Kern General Hospital, Bakersfield, Cal. which inhibits the fungus *coccidioides immitis*. It is a nitrofur derivative — 5-nitro-2-furfuryl-3-chloropropionate.

Sea mud is being put forward as a wonderful fertilizer by Timothy John O'Connell of Clark, Eire . . . and he has the Chief Agricultural Officer of Cork stirred up about it to the point of ordering a study of the cost of dredging the 20,000,000 tons of such mud in Cork Harbor alone—and getting it on the soil. Timothy says the mud is high in calcium, phosphates and potash, and contains 9% of calcium carbonate.

St. Regis Announces Non-Skid Coating

St. Regis Paper Company has developed a non-skid coating for multi-wall bags which also provides improved printing, less ink rub, and a cleaner package. "Lustergrip" utilizes a new principle of coating Multi-wall bags with a non-toxic coating which provides an even, clean surface. Printing is done prior to application of "Lustergrip" and since smooth instead of rough finish paper can be used, a better printing job is possible. Laboratory and field tests have shown that the new St. Regis "Lustergrip" coating provides a non-skid quality greater than rough finish paper with non-skid inks in addition to a better-looking and cleaner package.



ALL FROM ONE SOURCE:

anhydrous ammonia
fertilizer nitrogen solutions
sulfuric acid
and soon phosphoric acid

FROM no other single source can the fertilizer manufacturer obtain the particular combination of essential agricultural chemical raw materials to be available soon from the U.S.I. facilities at Tuscola, Ill.

Anhydrous Ammonia and Fertilizer Nitrogen Solutions. The raw materials for this operation are produced on the spot, insuring that supply is steady, reliable and ample.

Sulfuric Acid. U.S.I.'s 400 ton per day sulfuric acid plant produces all grades of virgin acids, including electrolytic and oleum, plus a good quality of process-spent acid suited to fertilizer manufacture. This plant operates year round, permitting U.S.I. to store during off-seasons for the large in-season demand.

Coming Soon — Phosphoric Acid. U.S.I. is building a new plant at Tuscola to produce wet process phosphoric acid from phosphate rock and U.S.I.'s sulfuric acid. The plant is scheduled to go on-stream by the end of 1956. Design capacity

will be 30,000 tons of P_2O_5 shipped as 75% phosphoric acid.

Other Agricultural Chemicals. U.S.I. can supply special products on a long term basis, if the demand becomes evident. This because facilities are flexible — integrated with all the manufacturing units at Tuscola which produce a wide variety of chemicals.

In the heart of the midwest farm area, U.S.I. provides one flexible source for fertilizer raw materials—a source organized for prompt service.

For further information, address your nearest U.S.I. office, or contact Chemical Sales, U. S. Industrial Chemicals Co., 99 Park Avenue, New York 16, N. Y.

U.S.I. INDUSTRIAL CHEMICALS CO.

Division of National Distillers Products Corporation
99 Park Avenue, New York 16, N. Y.
Branches in principal cities.

TWO TOOLS

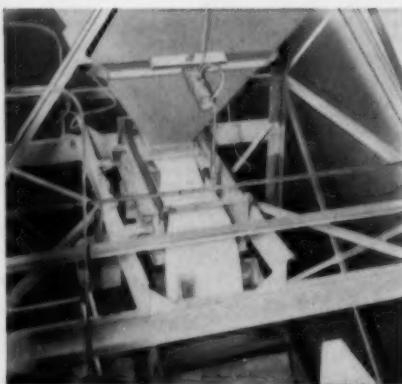
that bring further
automation to your
fertilizer production



Handling super phosphate or other fertilizer ingredients, Simplicity Gyration Screens combine positive action with perfect smoothness to increase your output. Simplicity Gyration Screens are mechanically vibrated, using a counterbalanced eccentric shaft which exactly counterbalances the weight of the entire deck assembly. A 3' x 8' Model LS Simplicity Single Deck Screen can handle as much as 50 tons of super phosphate per hour, with virtually no blinding of the screen, and a 3' x 6' Simplicity Model C can handle all other fertilizer ingredients at about the same speed. Every Simplicity Screen has the actual available screening area indicated by the given dimensions.



Simplicity Os-A-Veyor Feeders can be bin-hung, as shown in the photograph, or may be spring mounted. The Os-A-Veyor feeds along its entire length and allows for the use of a larger bin, thus avoiding bridging in the bin. Simplicity Os-A-Veyor Feeders have replaceable liners and can be provided with grizzly or screen sections, one or two decks, and can be totally enclosed. Simplicity Os-A-Veyor Feeders are doing a fast, efficient job for fertilizer plants throughout America.



Write us today for further information about Simplicity Os-A-Veyor Feeders, Gyration Screens, Conveyors and Woven Wire Screen Cloth.



ENGINEERING COMPANY • DURAND 3, MICHIGAN

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
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FOR EXPORT: Brown and Sites, 50 Church St., New York 7, N.Y.

FXL Units For Phosphoric Storage Offered By Butler

Fertilizer manufacturers can store phosphoric acid and other non-pressure corrosive liquids safely and economically with new vertical storage tanks recently introduced by the Butler Manufacturing Company. The new tanks feature plastic Flexi-Liners and are designed to solve many expensive storage problems now confronting the chemical, feed and fertilizer industries. Designated as FXL Units, these tanks and liners offset high costs of stainless steel and rubber lined tanks. Problems of bonding separation and pin-holes are eliminated since neither complicated vulcanizing or bonding processes are involved. Every Flexi-Liner is air tested before shipment and each tank is designed for the liner's easy installation and complete protection.

Contents of 75% phosphoric acid, 80% sulphuric acid, and other types of non-pressure corrosive liquids have been stored successfully in many plants throughout the country. Information and recommendations regarding storage problems for all types of corrosive liquids will be furnished upon request to the Butler Manufacturing Company's Fertilizer Equipment division.

FXL units are available in several popular sizes, including 11' x 12'—8,600 gallon and 11' x 17'—12,000 gallon capacities. However, many other capacities to suit specific needs are also available upon request. Each tank is fabricated entirely of hot rolled steel and two outlets are furnished in any combination of 2", 3" and 4" sizes.

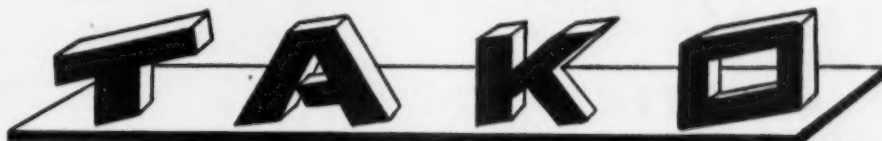
Flexi-Liners are laminated plastic and 30 mils thick. Laboratory tested for four years and field tested for two and one-half years, each liner is designed to protect the wall of the tank from corrosive effects of the contents and at the same time to protect the contents from iron contamination by the tank.

Installation is simple. Inexperienced workers can hang the liners easily and Butler will furnish a supervisor for each installation which normally takes around 10 man-hours. Two men, available 120 volt electrical current and adequate water for liquid testing is all that is necessary.

For full information, write to Butler Manufacturing Co., 7400 E. 13th St., Kansas City 26, Mo.

"USE WITH CONFIDENCE"

A
NATURAL
QUALITY
PRODUCT



Airfloated:
Bagged or Bulk

Guaranteed
less 1%
free moisture

QUALITY & SERVICE SINCE 1939

A HIGH GRADE COLLOIDAL KAOLINITIC KAOLIN

Used in large tonnage for years most successfully and economically as a prilling agent and conditioner of fertilizers. Excellent adhesive—absorption—colloidal properties. Excels in formulations of insecticides.

NON-ABRASIVE NON-HYGROSCOPIC NON-CAKING FREE-FLOWING

Shipping Point:

Plants:

Hackleburt, Alabama

THE THOMAS ALABAMA KAOLIN COMPANY,

2412 KEN OAK ROAD, BALTIMORE 9, MARYLAND

IT WILL PAY YOU TO INVESTIGATE "TAKO" FOR YOUR REQUIREMENTS

Uniform Quality

Prompt Shipments

MARKETS

ORGANICS: Demand for organics continues steady and producers of Nitrogenous tankage are in comfortable position with spot supplies available when needed by customers. Sewage Sludge continues in tight supply and the price is nominally \$2.95 per unit of Ammonia and 50¢ per unit of APA, bulk, to \$3.00 per unit of Nitrogen and 40¢ per unit of APA, bulk, f.o.b. shipping point, depending on the location of the production.

CASTOR POMACE: Rather little activity in this material as the supply position is rather poor. The price continues at \$40.00 per ton, bagged, f.o.b. Northeast production points, with limited supplies available through April.

DRIED BLOOD: Unground sacked

Blood is indicated at around \$4.75 per unit of Ammonia in the Chicago area, and approximately the same in the New York area.

POTASH: No unusual activity in this market, and movement is rather slow compared with this time last season. No change in prices is indicated.

GROUND COTTON BUR ASH: Demand continues excellent for this source of Potash which is primarily in the form of Carbonate of Potash. Supplies are available for shipment prompt through June. Current analyses vary from 38% to 42% K₂O which makes for a delivered cost approximately that of Domestic Sulphate of Potash.

PHOSPHATE ROCK: The market is rather sluggish for this material as the late season has curtailed the production of Superphosphate. The prices are unchanged.

SUPERPHOSPHATE: Triple Superphosphate movement is very

good, but normal Superphosphate movement is behind schedule for this time of the year. Prices are steady.

NITRATE OF SODA: In spite of heavy rains in the Southeast, demand has been fairly active and stocks adequate. Prices remain the same and are steady.

SULPHATE OF AMMONIA: Stocks continue at high levels at production points, and demand still too weak to take up available offerings.

GENERAL: Heavy rains throughout the Southeast after previous long dry spells has resulted in a considerable delayed season on mixed goods and Nitrogen materials. Fertilizer manufacturers report they are many thousand tons behind this time last year on sales and shipments, and they expect that this season will be quite short compared to previous seasons.

CF Staff-Compiled TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by COMMERCIAL FERTILIZER Staff

State	February		January		December	Oct.-Nov.-Dec.	Quar.	July thru December		January thru June		Year (July-June)	
	1956	1955	1956	1955	1955	1955	1954	1955	1954	1955	1954	1954-55	1953-54
Alabama	78,927	83,818	22,494	33,754	15,409	105,375	183,470	167,372	272,068	844,071	924,968	1,114,238	1,074,892
Arkansas	33,986	35,444	15,229	17,565	7,180	26,732	16,471	60,294	59,887	270,894	313,787	330,776	366,225
Georgia	47,499	68,552	41,187	68,552	64,682	170,229	161,692	250,968	225,083	1,047,875	1,147,157	1,273,445	1,361,254
Kentucky			55,413	32,920	14,838	58,090	32,928	88,119	91,386	431,024	489,024	524,488	577,929
Louisiana	22,925	25,901	12,716	12,299	7,415	36,496	42,679	39,345	78,067	1,047,875	250,747	310,848	325,218
Missouri	55,853	42,291	33,953	26,854	46,863	192,620	120,579	360,211	268,257	394,979	500,020	682,690	756,457
N. Carolina	178,085	201,650	86,554	109,528	53,152	163,008	193,088	225,182	264,475	1,566,158	1,558,472	1,830,633	1,815,572
Oklahoma	11,191	13,020	1,944	5,538	1,700	29,195	28,205	69,542	58,406	63,799	72,802	122,305	144,367
S. Carolina	123,996	137,020	41,629	57,129	24,259	78,592	92,182	119,947	132,604	791,206	752,639	928,715	936,558
Tennessee	13,554	10,271	3,399	5,263	6,267	77,805	114,771	136,925	167,383	282,462	405,756	523,349	523,303
Texas	52,179	62,939	27,459	30,917	23,630	112,453	149,708	193,704	212,885	371,587	374,309	584,269	560,381
California	(reports submitted quarterly)					188,204	176,395	361,615	318,270	603,857	513,300	922,127	830,327
Virginia	(reports submitted quarterly)						81,126 ¹		159,185 ¹	636,585	620,261	795,770	780,931
Indiana	(reports submitted semi-annually)							242,530	284,994	873,966	896,104	1,158,960	1,180,091
New Jersey	(reports submitted semi-annually)								53,830 ¹		231,686 ¹		289,614 ¹
Washington	(reports submitted semi-annually)							48,749	58,162	124,186	101,799	182,348 ¹	*
TOTAL	618,195	680,906	341,997	400,319	265,395	1,238,799	1,332,168	2,384,503	2,486,900	8,535,430			

(not yet reported)

* Not compiled

¹ Omitted from column total to allow comparison with same period of current year.

C R O P CHEMICALS

Amazing Future Painted At NAC Spring Meeting

Nuclear physics, applied to agriculture was a fascinating feature of the Spring meeting of the National Agricultural Chemicals Association, held in Hollywood, Florida, March 14-16, as two Government men discussed varied aspects. Some 300 attended.

Peaceful atomic energy is now working for agriculture, said Dr. S. B. Hendricks, USDA. It speeds research in the photosynthesis of plants, it shows how chemicals react inside plants and insects, it contributes to food preservation by a new technique, just recently revealed.

For example, explained Dr. Hendricks, atomic radiation has already been tested, and shows promise of eradicating the most destructive of all cattle insects, the screw worm—and success in this project may lead to many others.

The other Government man, George P. Larrick, U. S. Commissioner of Food and Drugs, predicted unlimited possibilities in nucleonics, the use of new, superior insecticides, herbicides and a variety of other products helpful in growing foods. He pointed up that his department is to make sure all these developments, as they come, are safe for the public.

"To teach growers to use pesticides safely as well as effectively is in many respects our biggest job. It is by all odds the best way to protect the public in this field. It is my hope that NACA can expand its activities in this area, and that the Food and Drug Administration and other agencies in Government can cooperate to the full extent that is needed to do this educational job. Like other types of safety education, this needs to be set up as a permanent and continuous activity."

Commissioner Larrick spoke following the presentation of a proclamation by Florida Governor LeRoy Collins setting aside the week of March 19 to 25 as "Food and Drug Law Golden Anniversary Week" in Florida. The proclamation was presented at the meeting by Florida's Commissioner of Agriculture, Nathan Mayo, in honor of the 50th Anniver-

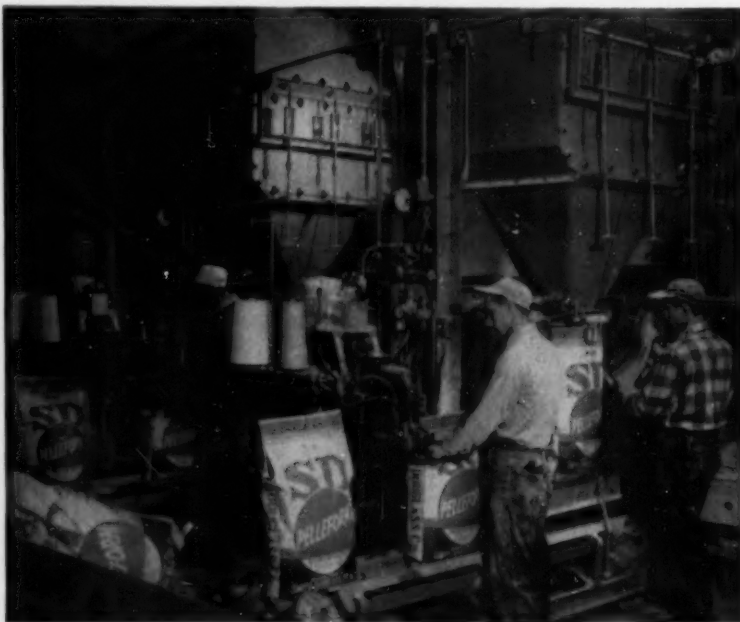
sary of Federal Food and Drug Laws, which is being celebrated throughout the country this year.

The Miller Pesticide Residue Amendment, signed into law in 1954, is the most recent addition to the nation's Food and Drug legislation, designed to insure American consumers of the safest foods, drugs and cosmetics in the world.

The National Agricultural Chemicals Association is made up of manufacturers and formulators of pesticide chemicals—insecticides, fungicides, herbicides, rodenticides and other chemicals used to combat crop-destroying insects, plant diseases, weeds and other farm pests.

Other speakers during the three-day meeting of the NAC Association were: Dr. J. Wayne Reitz, President, University of Florida; Mr. John A. Field, Vice President, Carbide & Carbon Chemicals Company; Dr. George L. McNew, Managing Director, Boyce Thompson Institute for Plant Research, Inc.; Dr. H. L. Haller, Assistant Director, Crops Research, ARS, U. S. Department of Agriculture; and Dr. H. G. Johnston, Head, Research Development, Division of Production and Marketing, National Cotton Council.

A new fertilizer packer developed by packaging service, Bemis Bro. Bag Company, has been setting new standards for speed and weight accuracy in the several trial installations which have been acting as "proving grounds" for this equipment. Shown here are: Two of the new Bemis fertilizer packers installed at the Smith-Douglass plant in Streator, Illinois. Maximum two-men crew packs out sixteen to eighteen 80-lb. bags per minute with accuracies of plus or minus 4 ounces.

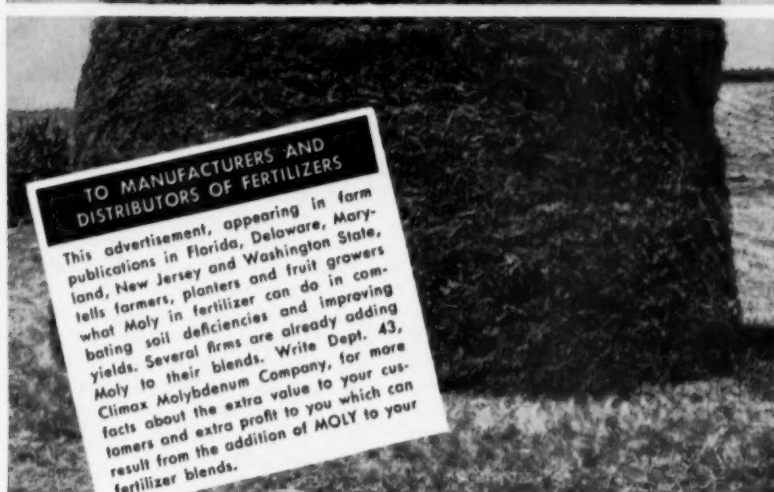


Pacific Coast Borax Co. Plans Revealed

At a recent bulk chemical sales conference held at Furnace Creek Inn, in historic Death Valley, California, the Pacific Coast Borax Company revealed its future expansion plans to members of the company's industrial, plant food, and agricultural sales divisions. Details of the company's new open-pit mining operations and expanded processing plant now under construction at Boron, California, were explained. Company officials indicated the new plant and mining facilities will provide a substantial overall increase in capacity designed to take care of the tremendous growing demand for borate products in industry and agriculture.

Shown for the first time was the company's new motion picture, "The Modern Way to Weed Control", illustrating the importance of the use of chemicals for the control of weeds in industry and agriculture. The film is now in general distribution and can be obtained by contacting the Pacific Coast Borax Co., division of Borax Consolidated, Limited, or Modern Talking Picture Service, Inc.

Sales personnel from all over the United States and Canada, representing the company's bulk divisions, were in attendance. Among those addressing the group were N. C. Pearson, director, Borax Consolidated Limited, London, England, J. M. Gerstley, president & general manager, Pacific Coast Borax Co., and J. F. Corkhill, vice president, charge of sales.



In experimental farm studies conducted in Washington State, the yield of alfalfa was increased nearly 40% by adding Moly to molybdenum-deficient soil. The fodder below the white line in the stack at the left indicates yield on moly-deficient soil. Volume above the line indicates increase produced by addition of Moly to soil. Photos courtesy of John Deere, Moline, Illinois.

TO MANUFACTURERS AND DISTRIBUTORS OF FERTILIZERS

This advertisement, appearing in farm publications in Florida, Delaware, Maryland, New Jersey and Washington State, tells farmers, planters and fruit growers what Moly in fertilizer can do in combating soil deficiencies and improving yields. Several firms are already adding Moly to their blends. Write Dept. 43, Climax Molybdenum Company, for more facts about the extra value to your customers and extra profit to you which can result from the addition of MOLY to your fertilizer blends.



How alfalfa yield has been stepped up nearly 40% by adding MOLYBDENUM to some acid Washington soils

Application of Sodium Molybdate to Moly-deficient soil, tests show, will result in sizeable yield increases

Scientific tests conducted by Dr. H. M. Reisenauer in Spokane County, Washington, have resulted in greatly increased yields of alfalfa. Investigations that began in 1952 have shown that poor forage yields were caused by Moly deficiency. Correction was made by adding one pound of sodium molybdate per acre. The applications were made in water solution, using a weed spraying outfit.

Other marked advantages result from the use of Moly

When alfalfa is grown in a Moly-deficient soil the plants tend to be stunted and pale green in color. Spots develop between the leaf veins, often spreading to affect the entire leaf. Such leaves finally die and fall off. When other conditions are favorable, these deficiency symptoms are corrected by the addition of available Moly to the soil, resulting in greater yields and more vigorous growth.

Tests here and abroad show that all crops need Moly

Thorough tests, made over the last 15 years, both in this

country and in many foreign areas, have shown conclusively that all crops need Moly in a form which can be assimilated readily by the plant. If available Moly is not present in the soil in sufficient quantities, then it should be added either alone or combined with fertilizers.

Now is the time to find out whether your own soil is deficient in Moly

Specific experiments with dozens of different crops, ranging from citrus to sugar beets, proved that Moly deficiency exists in soils in many areas in the United States. If your own soil lacks available Moly you may be getting much lower yields than you should. Get in touch with your County Agent. He will be glad to help you set up test plots. Write for our bulletin: "Testing for Molybdenum Deficiency." Address Dept. 47, Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

MOLY CAN BE ADDED TO ANY FERTILIZER BLEND

When ordering fertilizer you can always specify that molybdenum be included as an additive.

CLIMAX MOLYBDENUM

Safety Section Hears Fine Program at Southern Conference

Meeting with the Southern Safety Conference at the Atlanta Biltmore, March 4-6, the Fertilizer Section had its own program, and a good one it was. Chairman William A. Stone, Wilson & Toomer, who should have been in the chair was put to bed by his physician, due to a slight heart attack, and vice-chairman Lee S. Quentin, Cotton Producers Association, presided in his stead.

C. E. Hooks, Jr., of Florida's department of industrial safety told how it had been necessary to make a small staff go a long way, by careful analysis of the needs of industry, and the choice of those most needing safety help to work with. He reported that 85% of their recommendations have been followed.

George Dietz read a paper he and Tom Clarke, both GLF men, had prepared on Changing Times. Following is an extract from that paper.

"While your machinery has been changing, your manpower has been progressing rapidly, too. Those fellows who used to hang around outside the gate hoping for a snap of your finger, are fast disappearing. The man you hire now is an individual. He may not have a union button on his hat.

The law says you've got to pay

him a minimum wage; insure him against unemployment, keep track of the hours he works over 40 for premium pay; provide clean rest rooms; hear his grievances; contribute to his old age pension; provide safe working conditions. You dare not discriminate against him, and you dare not 'cuss' him out. Perhaps you have a contract that contains other benefits unheard of in the good old days. And if you're still in the rut of that supervisor of the good old days you're probably cursing out these advances that usurp your prerogatives instead of taking a new look at the man who stands before you.

Take off the dark glasses. This isn't the man you beckoned to at the gate 25 years ago. He's changed, too! He can read and write. He's a mechanic. He's an operator of thousands of dollars worth of your machinery. He is a chemist that watches your formula that controls your quality; in short he's quite a factor in your dollars and cents cost per ton. There are not as many men in our plants as we used to have, but those we do have developed skills.

When you hire a man today you hire an investment in good plant operation. So like the machinery, the

man, too, needs to be guarded. He needs the protection of personal equipment; the assurance gained by demonstration at formal safety meetings; the knowledge edited in a book of safety rules. He's too costly to hire without some pre-employment investigation. He's too valuable to lose as a victim to an indifferent attitude about accident prevention. Remember! These are 'Changing Times.' When your employee limps out of your plant, or is carried out on a stretcher to a waiting ambulance, a whole community knows about it. If it is bad enough, it probably makes the local T.V. telecast and for a while your public relations Hooper Rating goes stinko and there are fewer customers' trucks in the yard. Who wants to patronize a plant that is known to maim or kill its employees."

S. M. Roberts, Liberty Mutual, talked with a fine set of slides, and the slides and talk are available on request by any fertilizer safety men who wish to use them. They show the causes of accidents and are excellent to present to worker meetings. Mr. Roberts can be reached at his company's Norfolk office.

Floyd Miller, Spencer Chemical, replaced Elmer Perrien of Nitrogen

1. Lee S. Quentin, Cotton Producers Association, Atlanta, M. J. Hattier, Sou. Cotton Oil Co., New Orleans.
2. Curtis Cox, Virginia-Carolina Chemical Corp., Richmond, R. G. Diserens, Phillips Chemical Co., Bartlesville, Okla.
3. Floyd Miller, Atlanta, C. J. Wilson, Henderson, Ky., both with Spencer Chem. Co.
4. Frank Kruck, Safety Director, Virginia-Carolina Chemical Corp., Richmond, Ed Burroughs, Jr., F. S. Royster Guano Co., Norfolk, Mike Ellison, Mississippi Chemical Co., Yazoo City, Miss., O. A. Dixon, International Minerals & Chem. Corp., East Point.

5. S. M. Roberts, Liberty Mutual Insurance Co., Norfolk, George Dietz, G.L.F. Soil Bldg. Service, Baltimore.
6. Cameron Sinclair and Roger Hugg, East Point, J. K. O'Cain, Mulberry, Fla., O. A. Dixon and W. J. Boston, East Point, all with International Minerals & Chem. Corp.
7. A. E. Lord, Atlanta, J. C. Carr, Adel, Harold Green, Cordele, all with Cotton Producers Association.
8. L. R. Wood, Wilson & Toomer, P. C. Robinson, Florida Agric. Supply Co., both from Jacksonville.
9. Lee S. Quentin, Atlanta, and J. C. Carr, Adel, both with Cotton Producers Association.

SOUTHERN SAFETY MEETING

CF Staff Pictures



Division, and talked on safe handling of ammonia and maintenance of equipment.

Tuesday afternoon, the nominating committee report came in and the election showed Lee Quentin as chairman, Milton J. Hattier, Southern Cotton Oil as vice-chairman and Grayson Morris as secretary.

The first speaker was Curtis A. Cox, Virginia-Carolina, chairman of the Fertilizer Section, National Safe-

ty Council. He discussed safety trends in the fertilizer industry, briefly summing up the progress that has been made in the last five years, since the organization of the Safety Section. The accident frequency rates have shown a steady decrease in that time, he said, crediting the fact that instead of a company going along on its own, now by inter-company cooperation faster progress is possible.

Appropriate posters are selected from the National Safety Council listing and are sent weekly from the general office in Norfolk to each factory for display on the factory bulletin board; also pertinent posters from our Workmen's Compensation carrier and from the State Industrial Commission. We recommend that these posters not be allowed to remain on the bulletin board longer than one week.

All of our superintendents, foremen and leading maintenance men receive at home monthly copies of the National Safety Council Fertilizer Section News Letter and the Industrial Supervisor, this to let his family know the company is interested in safety and to give these men an opportunity, while they have some leisure time, to read about what others are doing and thinking about safety.

Periodically releases are sent out to all superintendents including material which would be timely and useful in their safety committee meetings; for example, one on heat exhaustion and the use of salt tablets. Twice, as an integral part of our program, we have forwarded to all plants "Safetygraphs", so each plant would receive one every other

SAFETY PAYS ITS WAY

By E. O. BURROUGHS

F. S. Royster Guano Company, Norfolk

"With our type of work and our class of employees, we just have to put up with accidents." It's very easy for a fertilizer man to accept this analysis of safety, but I discovered two enlightening facts.

For years our Company accident frequency had hovered between 30 and 50, but one plant had consistently an average of only one lost time accident every two years, a frequency averaging about 5. So management decided that something could be done about the high accident rate in our other plants.

We decided that the Safety Program in each plant must be the responsibility of the superintendent, and my role as manager of the Insurance Department would be in a staff capacity only, to give what help I could and to try to coordinate some of the safety efforts. Because superintendents might say—"Safety is a General Office project, and men down the line might associate the Safety Program with the visit from the General Office and ignore it the rest of the year. The basis of our program is as follows:

Competition is a useful tool in keeping a safety program before all ranks of employees. Due to the small number of employees in a single fertilizer plant, there is little chance for competition between departments. Our competitive spirit has to come between the various plants. To make this effective, two elements must be present. (1) At least the heads of the plants must know each other; (2) There must be a means of communication—dissemination of information to all of the units.

In the summer of 1948 we started a Superintendents Conference, held in Norfolk and lasting a week. One day of this conference is devoted to the safety program. This acquaintance makes comparative statistics of the plants much more meaningful, because now they compare the ac-

complishment of their plant not with just another plant, but against a plant operated by a guy they know personally.

We get out a Monthly Safety Letter to superintendents which carries a statistical sheet showing standings of plants for the period July 1st to June 30th. It shows for each plant accident frequency from the prior July 1st, date of last lost time accident, days and hours since last lost time accident. Comparison is also shown for the Company average with the same period of the preceding year.

MARYLAND SAFETY CONFERENCE LORD BALTIMORE HOTEL — MAY 10-11

The Chemical-Fertilizer Section will convene with the Governor's Safety-Health Conference and Exhibit, to be held at the Lord Baltimore Hotel, Baltimore, Md., May 10-11. It will be opened with a keynote address by K. Brantley Watson, McCormick & Co. and closed with a banquet which will be addressed by Governor Theodore R. McKeldin.

THURSDAY AFTERNOON, MAY 10

Chairman: J. E. Hamm, Jr., Fairfield Chemical

Associate Chairmen: Kenneth MacDonald, Kaiser Aluminum and Chemical; Arthur G. Jacobson—Baltimore—Lever Brothers

Time Speaker

2:30 P.M.—Homer K. Lambie, Kaiser Aluminum & Chemical, "The Motivation of Employees for a Successful Safety Program"

3:20 P.M. - 4:20 P.M.—Paul C. Lamb, Lever Brothers, "The Relationship between Safety & Production"

FRIDAY MORNING, MAY 11, 1956

Chairman: A. B. Pettit, Davison Chemical

9:30 A.M.—"Safety Organization of The Small Chemical Plant"—J. E. Nicholas, The Glidden Co.

10:00 A.M.—"The Safe Handling of Compressed Gas in Cylinders"—Allen L. Mossman, The Matheson Co.

10:50 A.M.—"Safety in Our Times"—Paul T. Truitt, National Plant Food Institute

FRIDAY AFTERNOON, MAY 11, 1956

Chairman: Geo. F. Dietz, Fertilizer Manufacturing Coop.

2:00 P.M.—"Planning for Safety"—Curtis A. Cox, Virginia-Carolina and General Chairman, Fertilizer Section, N.S.C.

2:30 P.M.—"Flash Fires in Fertilizer Mixers"—E. C. Perrine, Nitrogen Division

3:00 P.M.—Panel on Accident Case Histories. Moderator: F. Wayne High, Baugh Chemical. Discussion Leaders: R. G. Diserens, Phillips Chemical; J. E. Reynolds, Davison Chemical; John S. Roszel, Olin-Mathieson; John E. Smith, Spencer Chemical

month. We find "Safetygraphs" our most useful visual education tool for group presentation, as we do not have at our factories either motion picture or slide projectors.

And finally, our plants are entered in the National Safety Council Fertilizer Section Safety Contest. Beyond these helps, the Safety Programs of the individual plants are left to the initiative of the Superintendents. Some have accepted the challenge, used their ingenuity to keep safety before their people and put on an effective program. Others have taken the easy way and let safety ride.

In the period 1940 to 1945 our accident frequency averaged about 42. With this frequency our experience modification was approximately a 50% charge. In other words, we had to pay the normal Workmen's Compensation rate set up by the various states plus a 50% surcharge. In 1950, five years after we had started our safety program in 1945, our experience modification was 32.3% charge on the manual rate based on an average frequency of 29.5 for the years '46-'48 on which this experience modification was determined. In 1953 for the first time our experience modification dropped as low as zero. Actually we received a 1.6% credit,

slightly less than the established manual rates for Workmen's Compensation. This was based on an average frequency of 17.9 for the base years of 1949-'51.

In 1956 our experience modification stands at a 25% credit based on a frequency average of 13.2 for the base period 1952-'54.

This means that in 1956 we are paying 75% of the normal manual rates for fertilizer manufacturing as established by the various states, in comparison to 150% of the manual rates which we were paying prior to 1945. In other words, if we still had our accident experience of the years prior to 1945, instead of paying 75% of the manual rates as we are paying in 1956, we would be paying 150% of the manual rates and exactly double the present cash outlay for Workmen's Compensation Insurance. This represents an annual saving in insurance premium in excess of \$50,000.00. Based on this figure alone, we can be certain in saying this safety program has paid its way.

However, this is only a portion of the picture because the indirect costs of accidents have ranged from four to five times the direct cash cost of the Workmen's Compensation premium. These indirect costs are represented in part by such items as: (1)

time lost by other employees at time of accident; (2) slow-down of work by other employees after an accident; (3) loss due to having to substitute another employee in the team; (4) cost of training replacement; (5) damage to equipment; (6) damage to material in process of manufacturing; (7) cost of investigative procedure; (8) cost of various reports and other office work in connection with accident, which will give some idea of the multiple indirect costs involved in accidents.

Figuring on the conservative side, if in our industry the indirect cost should be only three times the direct cost, the annual savings would amount to in excess of \$200,000.00 on the basis of more than \$50,000.00 direct cash savings on the compensation premium as previously noted. Certainly, this returns a dividend instead of just paying the way of the safety program.

\$500 In Prizes For Working Safety Ideas

Prizes of \$500 will be awarded in a nation-wide "Picture of Safety Contest," beginning April 1 and ending June 30, designed to "uncover good ideas, which are already in practice, which have improved safety in fertilizer plants."

Sponsored by the Fertilizer Section of the National Safety Council, the contest is open to any employee of the fertilizer industry. All entries are to be mailed to J. C. Kato, Fertilizer Section, National Safety Council, 425 North Michigan Avenue, Chicago 11, Illinois. No entry blank is required in the contest.

Employees of the fertilizer industry are asked to first, take a picture of any (1) new device, (2) improved equipment, (3) tested operation, or (4) other better way of doing a job which has improved safety in their plant. Second, entrants are asked to write a short statement covering (1) the original unsafe situation, (2) what they did to correct this unsafe condition; and (3) results obtained.

The first prize winner in the contest will receive \$50; second prize, \$30; and third prize, \$20. In addition, forty honorable mention prizes of \$10 each will be awarded.

In addition to the cash awards, appropriate certificates will be presented to the winners. The first, second, and third certificate awards will be presented at appropriate ceremonies. Honorable mention winners also will receive certificates.

Nation-wide publicity, through Commercial Fertilizer, will be given the winners in the contest.

DRYERS **AMMONIATORS*** *for the*

GRANULATORS* **ELEVATORS** *Fertilizer*

COOLERS **CONVEYORS** *Industry*



DEHYDRO-MAT DRYERS (patented)
AND COOLERS (pat. pending)

Produce top quality fertilizers. Available in all sizes... especially suited for large capacities where floor space is limited.

**CONTINUOUS COMBINATION
AMMONIATOR - GRANULATOR**

One complete unit does the work of two. No need for individual ammoniator and separate granulator. Costs less... saves space... reduces operating expenses.



Also Conventional Dryers and Coolers

*TVA Licensed Manufacturer



Baltimore 24, Maryland, U.S.A.

Literature and information on request.

Contest sponsors point out that benefits and use of safety devices or equipment developed in fertilizer plants are more important than the actual photographs; however, good, sharp photographs and simple written descriptions are not unimportant and will be taken into consideration by the judges. They also emphasize that elaborate presentations are un-

necessary and undesirable.

National judges are: Ned Dearborn, president, National Safety Council, Chicago (chairman); Robert D. Gidel, supervising safety engineer, United States Department of Labor, Bureau of Labor Standards, Washington, D. C.; and Joseph Stennett, engineering director, American Mutuals Alliance, Chicago.

SAFE USE ON HANDLING EQUIPMENT

by R. G. DISERENS
Phillips Chemical Co., Bartlesville, Okla.

Handling equipment in a fertilizer plant covers everything from a long handled shovel to the ultra-modern equipment. My assignment is to talk on the safe use of this equipment. Shall I start with the long handled shovel? Several years ago when I was working in the oil fields, we referred to this piece of equipment as an ignorant spoon. I believe most of us are familiar with the hazards of the ignorant spoon. Don't misunderstand me when I say we are familiar with the hazards. I don't mean that we do not have accidents involving shovels. We certainly do. It is not at all uncommon, when we have sev-

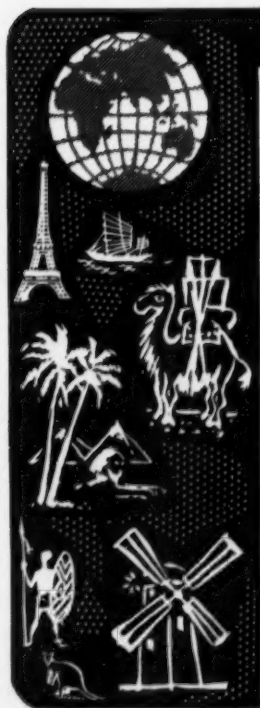
eral men working close together for one to strike the other in the face with the sharp edge of a shovel. Since most of us at some time or other has had personal experience with the shovel, I will move on to another piece of equipment that needs no introduction to most of us. That is the wheelbarrow, better known as the Irish buggy. Believe it or not, even in these modern times wheelbarrows are still much used in plants. We have frequent spills that would be rather difficult to clean up if it were not for the old faithful wheelbarrow. I believe I would be safe in saying that every plant in the fertilizer industry has had one or more back injury as the result of improper operation of a wheelbarrow. Most of us never think

of the necessity of training employees in the proper methods of operating these. Perhaps we should.

For sake of time, I will omit the discussion of two wheel trucks and dollies. However, in passing, we would like to call to your attention that over-loading and improper stacking are the most common causes of accidents involving this type of equipment.

Before we discuss mobile types of material handling equipment, perhaps we should discuss some of the things that remotely, and at times not so remotely, contribute to accidents experienced in material handling. When we have an accident involving a payloader, forklift or some other piece of mobile equipment, after investigating we often find that the operator, equipment, or both were at fault and let it go at that. My question is: How can we blame an operator or a piece of equipment when the floor surface is so rough it would be dangerous to ride over it in an army half-track? Another contributor to accidents involving material handling is poor lighting. We can train an operator to handle a piece of equipment properly but we cannot train him to see in the dark. It isn't uncommon for some of us to expect an operator to drive a payloader down a three-foot aisle at ten or fifteen miles per hour with fifteen hundred pounds of fertilizer in the bucket directly in front of him and

*Note—Presented at the Southern States
Safety Conference
Atlanta, Ga.,
March 6, 1956*



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not have an accident; but should he have an accident, we blame the operator. I could continue and describe some of the dust conditions that contribute to accidents; however, I will refrain since most of us are familiar with these conditions. I have grossly exaggerated some of the conditions in plants, yet we should seriously consider such causes of accidents as rough floors, poor lighting, narrow aisles and dusty conditions before we charge the accident to the driver or equipment.

I was reading an article recently where Mr. Faulkner of Liberty Mutual Insurance Company stated, "It is certain that material handling accidents are costing American industry as much as, if not more than, any other single type of industrial injury." We know that safe use of handling equipment will certainly reduce our accident frequency.

To insure safe use of handling equipment we must first start with the operator. When selecting a driver we should consider his physical fitness, mental ability and attitude. It seems rather foolish to select a man who is physically unfit or has a belligerent attitude, to operate a costly piece of equipment. Should we correct this situation, we certainly would be making progress toward eliminating one of the big causes of accidents commonly known as the human element. We should initiate a good indoctrination program. This program should include a definite understanding with the operator as to exactly what is expected of him. Should he be expected to report on the mechanical condition of the equipment such as bad brakes, bad lights, etc., then this should definitely be understood before he starts operating the equipment. This is also the time to emphasize that speeding, reckless driving and horse play will not be tolerated. Numerous accidents can be attributed to the fact that the operator of equipment did not

know exactly what was expected of him.

We have selected a safe driver for the mobile handling equipment. Now we must consider the equipment. We all know that we have a very serious corrosion problem in fertilizer plants. Knowing this, we should instigate a better maintenance program. This can be done by using a card check, rigidly enforced, on each piece of equipment. All equipment should be thoroughly cleaned and lubricated at regular intervals. To supplement this program each driver should check his piece of equipment prior to his tour or shift and report all discrepancies to his supervisor. However, it does very little good for the operator to report these needed repairs when the supervisor ignores the report. Everyone concerned must have the desire to keep the equipment in good operating condition in order to make a maintenance program work.

Good housekeeping is a must if you are to lower your material handling accident frequency. How many times have you observed a driver of mobile equipment going down aisles dodging bags that have fallen off and spilled? I believe this is quite common in the fertilizer industry. We should remove spills as soon as they occur. This practice would pay for the additional cost in product saved. Should you study the material handling safety problem you will find that in some cases you could eliminate blind corners. Widening of doorways is another possibility. It costs very little to designate lanes of traffic by marking off the lanes with yellow paint. This has proved very successful in congested areas. Where there are several gasoline driven units in a poorly ventilated area there is enough carbon monoxide generated to cause the operator to be mentally dull or even sick. The carbon monoxide hazard can be eliminated by installing catalytic

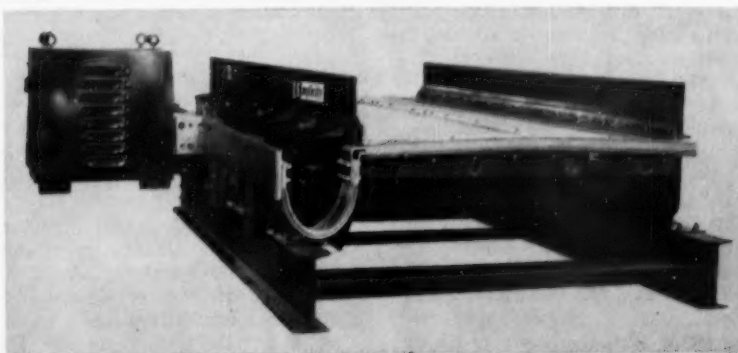
type mufflers. In dusty areas it is possible to install red blinker lights on the equipment so that equipment may be seen. Dock boards should have side plates high enough to prevent equipment from running off the side. One of the most important factors in the prevention of mobile equipment accidents is the setting up of definite safety rules and we must remember that the rule is no better than the enforcement.

Let us dwell briefly on stationary types of handling equipment. One of the most common type used in the fertilizer industry is the belt conveyor. A great number of the most serious accidents involving this equipment are due to cleaning the belt or pulleys while the equipment is in motion. These accidents can be eliminated by making a firm rule that forbids working on moving equipment. Guards should be installed over tail drums and other pinch points. Extensions should be made on grease fittings so that it will not be necessary for the employee to be exposed to moving equipment. Platforms constructed adjacent to places where pile-ups occur will reduce the hazard of removing material jams. Electric switches should be located so as to be readily accessible in event of an emergency.

Other types of material handling include screw conveyors, overhead trams, bridge cranes, motor cranes, and numerous others. You will find that the same safety program will apply to this equipment as mentioned before.

It is a known fact that poor maintenance and overloaded equipment will contribute to the accident frequency. Good housekeeping, definite safety rules and a preventive maintenance program will lower your materials handling equipment accident frequency.

For the chemical process industry, agricultural lime production, or other operations where screening is especially difficult because of damp or sticky materials, this new heated screen has been developed by Simplicity Engineering Company of Durand, Michigan.



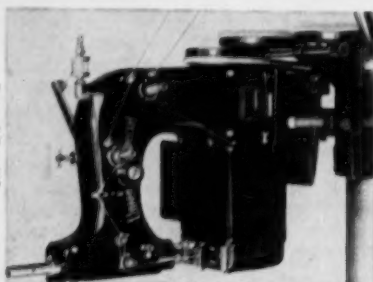
USDA-NPFI Program On 120 TV Stations

A television "Package Show" on "Dividends from Fertilizer Use" was featured by 120 television stations throughout the United States during February. The program, prepared by the television service of the United States Department of Agriculture in cooperation with the National Plant Food Institute, features simple, easy-to-follow rules for the use of fertilizer to promote better farming efficiency by reducing per unit costs of production.

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suggestions for preparing soil samples for testing locally.

Photographs are effectively used to show plant food deficiencies and drawings are employed to show that "back in 1935 the average plant food content of a bag of fertilizer was just over 18 per cent" while "today it averages over 27 per cent."

USDA states in the script that "every year cooperative action between the fertilizer industry, the NPFI, and Government agencies has given the American farmer and gardener better fertilizers."

1000 Stations To Use NPFI Radio Series

Four nationally-known agricultural authorities will speak on timely farming subjects over a "network" of approximately 1,000 radio stations which will use the Twelfth Farm Radio News Service series, sponsored by the National Plant Food Institute. Most of the stations will use the recorded series during the next few weeks.

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Dr. A. H. Moseman, Director of Crops Research, Agricultural Research Service, United States Department of Agriculture, on "Grow-



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ing Better Crops." A noted agricultural scientist, Dr. Moseman cites that "using the right kinds and the right amount of fertilizer can frequently do more to lower production costs than any other single farm practice."

Robert Howey, President, National Vocational Agricultural Teachers' Association on "Beating the Price-Cost-Squeeze." A well-known agricultural leader, Mr. Howey emphasizes that "efficient use of fertilizer takes on new and greater significance if farmers gear their programs to the problem of beating the so-called price-cost-squeeze."

Donald A. Williams, Administrator, Soil Conservation Service, USDA, on "Know Your Soil for Thrifty Farming." A noted SCS leader states that "... the proper use of fertilizers is one of his (the farmer's) most important tools in carrying out a conservation plan, in making land use adjustments, and in making his farm produce efficiently."

Earl L. Butz, Assistant Secretary of Agriculture, USDA, on "Public Relations for Farmers." A USDA authority, Mr. Butz emphasizes that "American agriculture has been doing a terrific job of feeding and clothing the nation at modest prices."

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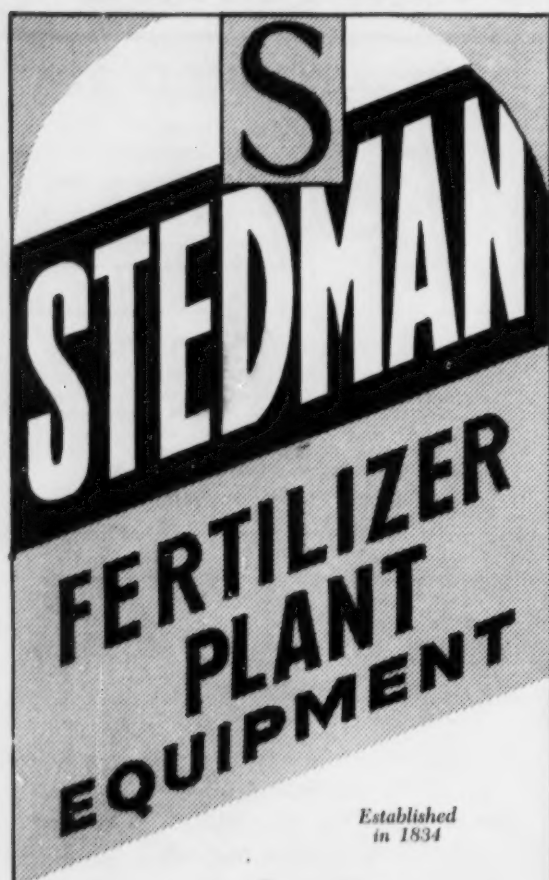
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